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The Early Development of Gas Lighting.

[A paper prepared by MR. M. R. MORGAN, for the Nineteenth Meeting, Pacific Coast Gas Association.]

Early Experiments on Gas.—While these famous scientists were making discoveries and establishing theories, the practical side of gas lighting was also being developed. Although the existence of burning springs and inflammable air from the earth had been known for hundreds of years, the first record of an intelligent investigation into causes was written by Mr. Thomas Shirley, Lancashire, England, in the year 1659, and published in the "Transactions of the Royal Society," June, 1667; this paper may be found also in Clegg's "Treatise on Coal Gas." Being the earliest account on record of a critical examination of natural gas, a few extracts may prove interesting.

"Description of a well and earth in Lancashire, taking fire by a candle approached to it: About the latter end of February, 1659, I was entertained with the relation of an odd spring near Lancashire, * * * The people of the town did affirm that the water of the spring did burn like oil. When we came to the spring and applied a lighted candle to the surface of the water, there was suddingly a large flame produced which burnt vigorously. * * * I observed the water at the burning place did boyle and heave like water in a pot upon the fire. * * * This boyling I conceived to proceed from the eruption of some bituminous or sulphureous fumes, considering this place was not above 30 or 40 yards distant from the mouth of a coal pit there: and indeed the whole country for many miles compass is underlaid with coal. Applying my hand to the surface of the burning place of the water, I found a strong breath, as it were a wind, to bear against my hand. Then I caused * * * the water to be drained away, and applying the burning candle to the surface of the dry earth at the point where the water burned before, the fumes took fire and burnt very bright and vigorous; the cone of the flame ascended a foot and a half from the earth, and its base was of the compass of a man's hat about the brim. I then caused a bucket of water to be poured on the fire by which it was quenched, I did not perceive the flame to be discoloured like that of sulphureous bodies, nor to have any manifest scent with it. The fumes when they broke out of the earth and prest against my hand, were not, to the best of my remembrance, at all hot."

While it is evident from this description that Shirley suspected a connection between the escaping gas and underlying coal beds, he did not continue his investigation to the logical end. A few years later Dr. John Clayton noticed a ditch in the same neighborhood "wherein the water would seemingly burn like brandy," and continuing, states:

"I observed that there had formerly been coal pits in the same Close of Ground; and then I got some coal from one of the Pits nearest thereunto, which I distilled in a retort in an open Fire. At first there came over only Phlegm, afterwards a black Oil, and then likewise a spirit arose, which I could no ways condense, but it forced my Lute or broke my glasses. Once when it had forced the Lute, coming close thereto, in order to try to repair it, I observed that the Spirit which issued out caught fire at the flame of the candle, and continued burning with violence as it issued out in a stream, which I blew out, and lighted again, alternately for several times. I then had a mind to try if I could save any of this Spirit, in order to which I took a turbinated Receiver, and putting a candle to the Pipe of the Receiver, whilst the spirit rose, I observed that it catched flame, and continued burning at the end of the Pipe, though you could not discern what fed the flame. I then Blew it out, and lighted it again several times; after which I fixd a Bladder, squeezed and void of air, to the Pipe of the Receiver. The Oil and Phlegm descended into the Receiver, but the Spirit, first ascending, blew up the Bladder. I then filled a good many Bladders therewith, and might have filled an inconceivable number more, for the Spirit continued to rise for several hours, and filled the Bladders almost as fast as a man could have blown them with his mouth, and yet the quantity of coal I distilled was inconsiderable.

"I kept this Spirit in the Bladders a considerable time, and endeavored several days to condense it, but in vain. And when I had a mind to divert strangers or friends, I have frequently taken one of these Bladders, and pricking a hole therein with a pin, and compressing gently the Bladder near the Flame of a Candle till it once took fire, it would then continue flaming till all the Spirit was compressed out of the Bladder; which was the more surprising, because no one could discern any Difference between these Bladders and those which are filled with common Air."

This is the first time coal was distilled for the express purpose of obtaining illuminating gas, and the gas stored and lighted. The quo-

tation above is taken from a letter written by Dr. Clayton to the Hon. Robert Boyle, and published in the "Transactions" of the Royal Society for 1739. The exact time of this experiment is uncertain, as the letter was not dated; however, it must have been before 1691, the date of Boyle's death, and from all available accounts, can be fixed as some time during the decade between 1660 and 1670.

The distillation of coal for the production of tar was carried on as early as 1675, and, in the 18th century, became an important industry. In 1781 a patent was granted to the Earl of Dundonald for a "process of extracting pitch, tar, essential oils, volatile alkali, mineral acids, salts and cinders from pit coal;" although gas was not mentioned it was produced plentifully in the kilns, and was frequently fired. Some early writers state that it was collected in bladders and lighted in Culross Abbey as a curiosity.

About 1784 Jean Pierre Minckelers, Professor of natural philosophy in the University of Louvain, distilled coal to obtain gas for a balloon, and in the year 1785 lighted his lecture room with gas as a demonstration to his students.

The Birth of Gas Lighting.—Toward the end of the 18th century, the production of gas by chemical means had become a common experiment; its escape from coal mines had been noted, and some progress had been made toward its production by the distillation of coal. However, no one had yet conceived the thought of using it as an illuminating agent in place of lamps and candles. William Murdoch was the first man to turn to practical account the idea of producing artificial light from coal gas, and is justly honored as the "Father of Gas Lighting."

Murdoch was born August 21, 1754, in the village of Lugar, parish of Ayeshire, Scotland, and died at Handsworth, England, November 15, 1839, aged 85 years. His father, John Murdoch, was a farmer and millwright, and the son inherited his father's inventive faculty and mechanical skill. In 1777, when young Murdoch was 23 years of age, he went to Birmingham to seek employment, and was engaged by the engineering firm of Boulton & Watt, at Soho near Birmingham. Mathew Boulton, an English manufacturer and engineer, founded the Soho Works in 1762; James Watt of steam engine fame became his partner in 1774, and it was at the Soho shops that Watt's early steam engines were built, and where they were developed from mere experiments to a state of commercial reliability. Boulton seems to have made his establishment a scientific and engineering center that attracted the brightest minds of France and America as well as of England. He was on terms of friendly intimacy with our Benjamin Franklin, who was prominent in diplomatic negotiations between the American Colonies and England during the exciting years immediately preceding the Revolution. It was at Boulton & Watt's that Priestly, the discoverer of oxygen, met Dr. Darwin, in 1780, and it was here that Murdoch, Clegg, Southern and Sir Henry Creighton met and discussed technical problems in connection with the production of coal gas.

During his apprenticeship at Soho, Murdoch became an expert in mechanical engineering, and made many valuable inventions and improvements in connection with the steam engine and shop tools in general. He became the representative of the firm in Cornwall, and erected and kept in order many of Watt's engines, which at that time were used principally for the purpose of pumping water out of coal mines.

Mr. Chas. Hunt, in his "History of the Introduction of Gas Lighting," gives many interesting facts bearing upon Murdoch's early life. The two extracts following throw a flood of light upon the character and personality of this famous inventor.

"The first pumping engine was erected by Boulton & Watt, at Ting-Tang Mine, Gwennap, and this was quickly followed by two others, one at Whealy Busy, Chacewater, and the other at Owen Vean, near Marazion. This was in 1778, in which year Murdoch was sent to Cornwall to take charge of them. Here he worked hard and incessantly, literally fighting his way through all obstacles; the story being told, on the authority of Watt, how on one occasion some of the mining captains 'having attempted to bully him, he quietly locked the door of the room in which they were accembled, stripped and, making a dexterous use of those arms with which Nature had supplied him, administered to more than one of their number a lesson of persuasive efficacy, such as they would never forget, and such as he was never called upon to repeat.' He was, in truth, of Herculean proportions, and in muscular power nearly unrivalled.

"It has been stated that Murdoch erected in Cornwall the first engine with a separate condenser, which implies that he erected for the firm their first engine in Cornwall, since the separate condenser was the essential feature of Watt's engine. Whether this be so or not, he was certainly in charge very shortly after it was started, and his life at this period, and during the next few years, is graphically described in a letter written by Boulton to Watt in 1782: 'Murdoch,' he says, 'hath been indefatigable ever since he began. He has scarcely been in bed, or taken necessary food. After slaving night and day on Thursday and Friday, a letter came from Wheal Virgin that he must go instantly to set their engine to work, or they would let out the fire. He went and set the engine to work; it worked for the 5 or 6 hours he remained. He left it, and returned to the Consolidated Mines about eleven at night, and was employed about the engines till four this morning, and then went to bed. I found him at ten this morning in Poldice Cistern, seeking for pins and castors that jumped out, when I insisted on his going home to bed.'"

It appears from statements in some of Murdoch's own letters that, during the year 1792, he first began experimenting with gases obtained from distillation. These experiments were made at Redruth, Cornwall, which, therefore, was the birthplace of gas lighting. It is recorded by Accum that, in the course of Murdoch's investigations—

"He discovered that the gas obtained by distillation from coal, peat, wood, and other inflammable substances, burnt with great brilliancy upon being set fire to; and it occurred to him that, by confining and conducting it through tubes, it might be employed as an economical substitute for lamps and candles. The distillation was performed in iron retorts, and the gas conducted through tinned iron and copper tubes to a distance of 70 feet. At this termination, as well as at the intermediate points, the gas was set fire to as it passed through apertures of different diameters and forms, purposely varied with a view of ascertaining which would answer best. In some the gas issued through a number of small holes like the head of a watering pan; in others it was thrown out in thin long sheets; and again in others in circular ones, upon the principle of Argand's lamp. Bags of leather and of varnished silk, bladders, and vessels of tinned iron, were filled with the gas, which was set fire to, and carried about from room-to-room, with a view of ascertaining how far it could be made to answer the purpose of a movable and transferable light. Trials were likewise made of the different quantities and qualities of gas produced by coals of various descriptions, such as the Swansea, Haverfordwest, Newcastle, Shropshire, Staffordshire, and some kinds of Scotch coals. Mr. Murdoch's constant occupations prevented his giving farther attention to the subject at that time; but he again availed himself of a moment of leisure to repeat his experiments upon coal and peat at Old Cumnock, in Ayeshire, in 1797."

In 1798 Murdoch built a "large retort" to light one of the Soho shops, and in April, 1802, he made a public display at Soho by illuminating the towers with "Bengal Lights"—*i. e.*, flaring open burners supplied with gas directly from a retort placed in the fireplace below. It has been stated by some authorities that the entire front of the Soho works was illuminated with gas upon this occasion, but Hunt shows that this is an error and could not have been accomplished at the then existing state of development of the art. This illumination was made to celebrate the signing of the Treaty of Amiens between France and Great Britain, March 27th, 1802.

In 1804 Murdoch built a plant large enough to light the entire works at Soho, and in 1805 another plant to supply the cotton mill of Messrs. Phillips & Lee at Manchester, where about 900 burners were supplied. The retorts were placed vertically and were charged by means of a simple mechanical stoking device, consisting of a cage to hold the coal and a crane to withdraw it after distillation. Clegg states that lime purifying was not used, and that "siphons were placed along the pipes conveying the gas, to collect the tar that condensed in them." Murdoch wrote a very complete description of this installation, which was read before the Royal Society, February 25, 1808, and for which he received the Count Rumford Gold Medal. This paper may be found in "King's Treatise on Coal Gas."

We learn from "Richards" that "neither Boulton and Watt nor Murdoch continued long to follow this branch of industry, but devoted themselves more particularly to the manufacture of steam engines, in the construction of which Murdoch added to his great reputation by the invention of the eccentric and rod. By this, and his other great merits, Murdoch very deservedly acquired a competent independence." Boulton died August 18th, 1809, aged 81 years, and the Soho works were carried on by Watt and Murdoch.

Samuel Clegg, a pupil of Murdoch's and an apprentice at Soho,

now turned to gas engineering and made many inventions and improvements. In 1805 he lighted the cotton mill of Mr. Henry Lodge, near Halifax; and, in 1807, the manufactory of Messrs. T. & S. Knight, near Manchester; in 1808, the College of Stonyhurst, Lancashire; in 1809, Mr. Harris' factory at Coventry; in 1812, the cotton mills of Ashton Bros., at Hyde near Stockport, where the hydraulic main and wet lime purifier were introduced. At the Coventry plant, lime was used in the holder and "prevented from settling to the bottom by an agitator put in motion from time-to-time." In 1809 Clegg prepared an account of his plan for the application of gas lighting to mills and factories for which he was awarded a silver medal by the Society of Arts. From 1813 to 1817 he acted as engineer of the first gas company ever formed; he built several large works, and in 1815 invented the gas meter. He died on the 8th day of January, 1861, in his 80th year.

In the case of gas lighting, as with many other great inventions, the same idea seems to have occurred to two men at about the same time. A young chemist in Paris, named Philippe Lebon (an engineer in the Department of Roads and Bridges) was engaged in making experiments similar to Murdoch's, during the years from 1791 to 1799. In September, 1799, he secured a patent for a "Thermolampe," and on August 24th, 1801, was granted a "Certificate of Additions" to his patent. His specification states that "wood, coal, oil, roots, grease, or other combustible material may be used, the result being always the same." Lebon was hampered by lack of funds, also by the fact that he could spare but little time from his regular duties to devote to his invention. His first public display was made in the winter of 1801-2, at a house in the Rue St. Dominique, Paris, which was lighted with gas generated in one of the patent thermolampes. This exhibition excited widespread comment and its fame reached to Frankfort, where one Frederick Albert Wintzler (a German, afterwards known as Winsor) became so much interested that he went at once to Paris to see for himself. "The wondrous effects of common smoke being made to burn with greater brilliancy and beauty than wax or oil."

Formation of the First Gas Company.—Of all the men connected with the development of gas lighting, no one is more interesting than this German enthusiast and "promoter," who apparently decided in a single instant to leave his home, drop all former associates and occupations, and devote himself with untiring energy to the task of introducing this new light in a land of strangers. Careful search has failed to disclose any particulars of his history, prior to the time of his appearance in Paris, early in 1802. Hunt states that he was a native of Zuaim, Moravia, and we learn from "Richards" that he died in 1831, having been granted a pension of £200 a year by the Chartered Company. He appears to have been lightly built and of a highly nervous temperament. Although deficient in scientific training and wholly ignorant of chemistry, he plunged boldly into the subject of gas lighting and fairly earned a place among those honored as pioneers in the art. Any lack of practical knowledge was easily bridged by his remarkable perseverance, boundless imagination, and unlimited confidence. He had the commercial sense highly developed, and might well be taken for the original "Colonel Sellers," for he had all the earmarks of that famous character. He was a constant attendant at Lebon's exhibitions and assisted in some of his experiments. He made an offer of "100 Louis d'or" for a thermo-lampe, which was refused by Lebon who wanted a subscription raised sufficient to purchase 200 stoves.

Lebon seems to have made no progress with his apparatus, beyond giving a few public exhibitions at his house. He became involved in the political strife attending Napoleon's coronation as Emperor, and was killed (by an assassin) in Paris, December 2, 1804.

Winsor left Paris in April, 1802. In a letter he states that he studied during the day and labored during the night, until he succeeded in solving the secret of the thermolampe; he then declared himself "a legitimate and successful imitator and proprietor" of Lebon's process, and in 1803 went to London, where he started at once to interest moneyed men in his plan for the formation of a company. Experiments were carried on in the unoccupied shop of a retired coach builder, named Kenzie, near Hyde Park, which proved sufficiently successful to induce Mr. Kenzie and a few others to finance a public display at the Lyceum Theatre, early in 1804.

Winsor, being a poor speaker and unfamiliar with the English language, employed Edward Heard to deliver his lectures and make the necessary experiments. In 1806 this same Heard patented a process of using lime as a purifier, and, in 1819, he and David Gordon obtained a patent for compressing gas in metal drums to furnish a portable supply.

Apparently Winsor was not aware of Murdoch's achievements at Soho, for, in May, 1804, he obtained a patent for "An Improved Stove, Oven or Apparatus for the Purpose of Extracting Inflammable Air, Oil, Pitch, Tar and Acids from all kinds of Fuel." The specification states that "Inflammable gas or air being purified from carbon may be lead and conducted in a cold state through tubes of silk, paper, earth, wood or metal to any distance in houses, rooms, gardens, and streets to produce light and heat." Immediately after securing his patent, Winsor started a vigorous advertising campaign. Giving his fancy free reign he published numerous pamphlets setting forth the profits to be derived from "The British, Imperial Patent Light-ovens and Stoves," he being described as "The second Inventor and Improver." By an elaborate account he proved that with his stoves "Above 1,000 per cent. are saved and gained in light, heat and other valuable products." He also stated that "Smoke is now discovered to contain the most valuable substances, and if properly extracted, gathered, washed, purified and resolved, regains no less than five costly products; viz., oil, patch, acid, coke and gas." By his process a profit of more than £64 was promised on an investment of £6.

It is clear that, from the first, Winsor's idea was to form a company and supply gas to the public on a large scale. He calmly ignored the storm of criticism and ridicule provoked by his bombastic pamphlets, and was not in the least discouraged by his want of technical training and mechanical skill; disregarding troublesome details, he soared aloft in an atmosphere of easy millions, and, after a year of lectures and experiments, stated that he had made "Great improvements in his patent light-stoves, and purified the gas lights from all scent, and increased their lustre." He now solicited subscriptions to a "National Light and Heat Company, for providing our streets and houses with hydro-carbonic gas lights on similar principles as they are now supplied with water," and assured investors that "A deposit of £5 would suffice for realizing the plan in London, and all further sums wanted would prove but a small deduction from speedy profits."

Toward the end of the year 1806 he had secured financial support sufficient to enable him to maintain offices and a laboratory at No. 97 Pall Mall, on the site of the present Carlton Club. Here he delivered lectures to the public and continued his "official experiments" on the distillation of coal.

In December, 1806, pipes were laid in Pall Mall, from Haymarket to St. James' Street, and connected to the experimental plant at No. 97. These (the first gas mains laid in a public street) were made of sheet lead, bent around a material and soldered at the edges. Street lamps were erected, and on January 28th, one side of the street was lighted with gas; both sides being lighted June 4th, 1807. This was the earliest application of gas to street lighting in the history of the world, and caused intense excitement. Subscriptions poured in upon Winsor, and a committee of 26 subscribers was organized, officers appointed, and resolutions passed appropriating £20,000 to enable him to continue operations and to obtain a charter of incorporation from the Government.

The first regular meeting of the embryo National Light and Heat Company was held at Winsor's house, July 12, 1807, with Mr. J. L. Grant acting as President. At this time the plan was to form a Company with a capital of £1,000,000, which should have a monopoly of gas lighting throughout the British Empire. A petition was presented to King George III. praying for the exclusive privilege of supplying gas, and claiming a profit of some 600 per cent. on the proposed operation. The matter was referred to Parliament, in 1809, the promoters having modified their plans to the extent of asking for an exclusive franchise in London only, and reducing the capital of the proposed Company to £500,000. At an exhaustive hearing, before a committee of the House of Commons, commencing May 5th, 1809, the grant was opposed by Murdoch and Watt, who proved conclusively that Winsor was not the original inventor he claimed to be; and, moreover, that many of his statements were visionary and not supported by facts. Upon the showing made by Murdoch and Watt and their friends, Winsor's petition was not granted, consequently the National Light and Heat Company was not incorporated.

Had Murdoch and Winsor perceived that their interests were mutual, instead of believing them to be opposed, the story of early gas lighting might have been quite different. Murdoch had not patented his apparatus, although he mentioned the matter to Watt, in 1794 or 1795. Apparently neither he nor Watt realized the full significance of the experiments at Redruth; they had no conception of the enormous possibilities of gas lighting as a public utility, but

seemed more interested in the scientific and engineering phase of the subject. Winsor, on the contrary, while hopelessly at sea as a gas engineer, showed a magnificent grasp of the business side of the enterprise. Notwithstanding his failure to launch the National Light and Heat Company, the project had been so well advertised and promised such large profits that it was not allowed to rest.

In 1810 another application was made to Parliament to form the "London and Westminister Gas Light and Coke Company." This contained none of the absurdities of the former petition. The capital was reduced to £200,000 and the field of operation limited to London and its suburbs. The Company was to be an enterprise solely for the purpose of supplying gas, and was not to manufacture gas apparatus. Probably this provision was secured by Murdoch and Watt to protect their interests at Soho. An act of incorporation was passed by Parliament, in 1810, and a Royal Charter granted in April, 1812, the Company being known during the next 60 years as the "The Chartered Company."

Until 1813, when Samuel Clegg became its Engineer, the Chartered Company was run by Winsor, Frederick Accum and Hargreaves. Clegg states that at this time the idea of lighting a town with gas was was still thought to be a visionary scheme, and adds, "So great was the prejudice entertained against the introduction of gas lighting, not only by the public, but also by men of science, that it seemed to present an insurmountable obstacle to its further progress." To overcome this prejudice, the Company fitted up houses and shops without charge and for nearly 2 years supplied gas free to all who would use it. When the passage to the House of Commons was first lighted with gas, the architect insisted that the pipes be kept at least 4 inches from the walls, as he feared they might get hot and set fire to the building.

On the evening of the 31st of December, 1813, Westminister Bridge was lighted. It is recorded by Clegg that upon this occasion the oil lamp-lighters refused to act, and that he himself had to light the new gas lamps for a few nights. In April, 1814, the streets of St. Margaret's Parish, Westminister, were lighted with gas and the old oil lamps removed. The innovation was bitterly opposed by the contractors who had supplied the oil lamps. When told that their lamps gave no light, one replied that that was not in their contract, which only stated "The lamps were to be *lighted* from sunset to sunrise." During the next few years oil street lamps were replaced with gas lamps as fast as mains could be extended.

In 1815, Accum published the first "Treatise" on gas lighting. His general plan shows two horizontal retorts with ascension pipes, hydraulic main and rectilinear holder. Gas was carried from the hydraulic main in a spiral pipe through the water tank of the holder (which served as a condenser) to a lime purifier with an agitator, and thence back to the single-lift holder. He states that at this time he was informed by Clegg that, "The total length of the pipe laid down as mains in the streets of London amounts already to nearly 15 miles."

The first mains laid by Clegg were 2 inches in diameter, but were soon found to be too small, and were replaced by 4-inch and 6-inch mains. These were cast iron pipes made in 4½-foot, 6 foot, and 9-foot lengths. Wrought iron pipes were unknown, services and house pipes being formed of old musket barrels. The muzzle of one screwed into the breach of the next. At the works, the rectangular holder (the form adopted by Lavoisier), was retained until 1816, when the cylindrical form first appeared.

At Stonyhurst College (lighted by Clegg in 1808) the holder had a capacity of 1,000 cubic feet but was considered "unwieldy" by Mr. Wright, the Superior, who suggested that two 500-foot holders be erected in its place.

A report, made in January, 1822, by William Congreve, Government inspector of gasholders, contains following data regarding holders:

"The Peter street works (Chartered Company) consists of 18 gasometers; the average contents of each may be stated at 15,000 cubic feet. The Dorset Street Works contain fewer gasometers, several of these erected in one building, of the enormous size of 40,000 cubic feet. The Brick Lane Works are nearly on the same scale as those of Peter Street, consisting of 16 gasometers some of them working in coal tar."

In his report for 1823 Congreve stated that "At Whitechapel works two large canvas bags, of about 15,000 feet each, were for some time used as gasometers."[1]

1. The San Francisco Gas and Electric Company is now building a holder at the Potrero works having a capacity of 5,000,000 cubic feet. New York has several 10,000,000 foot holders, and a 15,000,000-foot holder is in use at the works of the New York Consolidated Gas Company, Astoria, Long Island.

In 1824 the exhauster was invented by Broadmeadow, and we learn from Creighton that teleseopic holders were also invented and in use about this time. No importance was attached to them until 9 years afterward, when they were first erected at the works of a Metropolitan Company then established. Hutchison, the Engineer of the Company, laid claim to (and patented) the invention, October 12, 1833, and from that period, on account of the extended application of gas lighting and the limited sites of the works, telescopic holders were rapidly introduced.

About the year 1817 the prejudice against gas lighting had been largely overcome, and works were established in several large towns throughout England. The Chartered Company increased its capital at various times, until (in 1823) it amounted to £900,000, almost the amount proposed by Winsor 15 years before for the ill-starred "National Light and Heat Company."

In 1823 dry lime purifiers were patented by John Malam. About 1820, a process of manufacturing oil gas was patented by Messrs. Taylor and Martineau, who secured an Act of Partiament (May, 1821) authorizing the erection of oil gas works. Within the next few years oil works were built at Bristol, Colchester, Dublin, Edinburgh, Hull, Leith, Liverpool, Norwich, Plymouth and Taunton. The new process did not prove successful, for we learn from King that oil plants were soon abandoned, and the works re-arranged to produce coal gas. The Edinburgh Oil Gas Co. was established in 1824, and, after a stormy existence, and a loss of £60,000, applied to Parliament in 1827 for power to convert the plant into a coal gas works. This Company had upon its directorate the names of many famous men of that time including John Robinson, Secretary to the Royal Society, and the illustrious author, Sir Walter Scott, who acted as Chairman. In Scott's Journal the following appears, dated November 21, 1825:

"Went to the Oil Gas Committee this morning, of which concern I am President, or Chairman. It has amused me much by bringing me into company with a body of active, business loving, money-making citizens of Edinburgh, chiefly Whigs by-the-way, whose sentiments amuse me. The stock is rather low in the market, 35s., premium instead of £5. It must rise, however, for the advantages of the light are undeniable, and folks will soon become accustomed to idle apprehensions or misapprehensions. From £20 to £25 should light a house capitally, supposing you leave town in the vacation. The three last quarters cost me £10, 10s., and the first £8, was greatly overcharged. We will see what this (the worst and darkest) quarter costs."

On May 21, 1827, he wrote: "Was at the Gas Council, where I found things getting poorly on;" and, on December 4th, 1821: "Summoned to pay arrears of our unhappy Oil Gas concern—£140—which I performed by draft on Mr. Cadell. This will pinch a little close, but it is a debt of honor and must be paid."

June 9th, 1828, he wrote: "I laboured till about one, and was then obliged to attend a meeting of the Oil Gas Company—as, I devoutly hope, for the last time."

This commercial enterprise was the last of several disastrous ventures that left the great poet heavily in debt. In his "Life of Sir Walter Scott," Lockhart states that "Woodstock, as we have seen, placed upwards of £8,000 in the hands of Sir Walter's creditors. The "Napoleon" (first and second editions) produced for them a sum which it even now startles me to mention—£8,000. As by the time the historical work was published, nearly half of the "First Series of Chronicles of the Canongate" had been written, it is obvious that the amount to which Scott's literary industry, from the close of 1825 to the 10th of June, 1827, had diminished his debt, cannot be stated at less than £28,000. Had health been spared him, how soon must he have freed himself from all his encumbrances."

At this time gas lighting was well established in England and also on the Continent. The dates of introduction are as follows:

London.....1813	Hanover.....1825	Nantes.....1838
Liverpool.....1816	Ghent.....1825	Leipsic.....1838
Manchester.....1817	Rotterdam.....1825	Sydney.....1841
Sheffield.....1818	Rousells.....1825	Hamburg.....1844
Glasgow.....1818	Berlin.....1827	Madrid.....1845
Edinburgh.....1818	Dresden.....1829	Rouen.....1846
Birmingham.....1819	Vienna.....1833	Breslau.....1847
Bristol.....1819	Havre.....1834	Rome.....1853
Paris.....1819	Caen.....1835	Heidelberg.....1853
Brussels.....1819	Amiens.....1835	Nice.....1854
Munich.....1822	Boulogne.....1835	Vera Cruz.....1855
Belfast.....1822	St. Petersburg..1835	Melbourne.....1856
Amsterdam.....1825	Lyons.....1835	Warsaw.....1856

Copenhagen	1857	Alexandria	1864	Ceylon	1868
Calcutta	1857	Milan	1864	Leeds	1870
Tasmania	1858	Bombay	1865	Yokohama	1871
Malto	1861	Rio Janiero	1865	Tokyo	1872
Shanghai	1862	Christchurch	1865	Montevideo	1872
Hong Kong	1862	Ceora	1866	Cologne	1878
Smyrna	1863	Moscow	1867	St. Johns	1879
Cape Town	1890				

Gas Meters.—This subject is to be technically treated in another paper, consequently only a brief historical outline has been prepared.

About 1812 or 1813, when gas had become a commercial product, the rate question came up. The Chartered Company's first price was 15s. ($3.60) per 1,000, and as there were no meters, the amount of gas consumed was estimated according to the size of the burners, and the length of time they were used. This was known as "The Contract System;" consumers paying a fixed sum for a certain number of burners of stated sizes, to be used from sunset until 9, 10 or 11 o'clock. Inspectors employed by the Company patrolled the lighted districts to see that consumers turned out their lights at the proper time. Mr. John Warren, one of the first directors of the Chartered Company, is mentioned by Matthews as the originator of this plan, which was followed in some cases a long time after meters had become well known.

The names of three men are particularly identified with the invention and development of the gas meter. They are Samuel Clegg, John Malam, and Samuel Crosley. In 1813 Clegg, then Engineer of the Chartered Company, devised the first arrangement to measure and record the flow of gas through a pipe. His first meter was constructed in 1815; its trial taking place December 9th.

As described by Samuel Clegg, Jr., son of the inventor, it "Consisted of two large bladders, filled alternately with gas, and contained in tin cans weighted to a certain pressure, the opening between them and the burners being closed alternately with quicksilver."

This meter is also described by Peckston, thus: "To a wooden frame were attached two small cylindrical vessels, into each of which worked a gasholder. From the ends of a beam, supported at its middle, the holders were suspended over and into their respective vessels. Admission of gas from the street main, and discharge to the house pipe, was controlled by a mercurial valve."

This arrangement was cumbersome and unsatisfactory, and (in 1816) Clegg invented the wet meter with a revolving drum. During the following year the wet meter was remodeled and improved by John Malam, a draughtsman, employed by the Chartered Company.

Further improvements were made by Alexander Wright, Goldsmith, Scholefield and others. Clegg's patent was purchased by Samuel Crosley, who introduced many refinements and made the wet meter an accurate measuring device. The valves and revolving drum were improved until a pressure of only 1-tenth of an inch of water was necessary for successful operation.

For the dry meter we are indebted to John Malam, his first model being tested in 1819 and patented in 1820. Apparently nothing further was done with the dry meter until 1833, when it was taken up and developed by James Bogardus. Bogardus was an American (born in New York, 1800; died, 1874). He was a watchmaker and engraver by trade and seems to have been a prolific inventor. His machine for the manufacture of postage stamps is still used in England. He patented a dynamometer, an eight-day clock, pyrometer, deep-sea sounding machine, etc., and was first to introduce wrought iron beams in building construction.

In 1843 William Richards made a dry meter with two diaphragms, two slide valves, and a dial, which, improved by Croll, Edge, Defries and Thomas Glover, is substantially the meter in use to-day.

An unusual application of the meter, known as the "Motive Power Meter," was patented in 1841 by George Lowe, Engineer of the Chartered Company. With slight re-arrangement, a cord and weight, or a spring are used to operate the meter as an exhauster to deliver gas at a pressure higher than that supplied by the main. Richards cites the case of a manufacturer who with such an appliance secured an uninterrupted gas supply for his factory during the time the feed main was cut at some distance from his works.

It is an interesting fact that the D-slide valve (which, with diaphragms and a dial practically constitutes the gas meter) was invented and patented by Murdoch, in 1799, in connection with various other improvements on Watt's steam engine. There seems to have been considerable delay attending the introduction and general use of meters. We learn that not until 1840 did the Chartered Company take up meters in preference to the contract plan. The idea was not approved by other companies, and was strongly opposed by consumers, many preferring to go without gas rather than allow the installation of meters on their premises.

In France, meters were legalized in the year 1846, and in 1859 the British Government passed the "Gas Sales' Act" making the gas meter legal as a measuring device, when duly approved and stamped by authorized inspectors. This act permitted a variation of 2 per cent. in favor of the company and 3 per cent. in favor of the consumer. About the year 1894 the prepayment meter was perfected in England, and has gradually won favor in some parts of the United States.

The first meters in this country were made in Baltimore, in 1832, by Samuel Hill. In 1848 the firm of Slaney & Collier was founded, afterward becoming "The Phoenix Meter Company." In 1859 the Phoenix Company failed, and two employees (Thomas and Harry Tansley with Edwin Baker) continued to make meters. In 1866 they were joined by Charles E. Dickey, who eventually bought out Baker and the Tansleys, and formed a Company which, in 1902, became the Maryland Meter Company.

In New York meters were made by Young, in 1835, and by Samuel Down, in 1835. Some time after this, Down was joined by Richard Merrifield, and the firm finally combined with others and formed the American Meter Company.

In 1849 a meter company was formed in Boston by Mr. George Darracott, President of the Boston Gas Light Company, and in 1860 another company was started by Nathaniel and Augustus Tufts, which eventually became the firm of C. W. Hinman & Company.

Coal, Oil and Natural Gas in the United States.—The discovery of petroleum and natural gas in America must be credited to the aborigines long before the country was inhabited by white men. The oil springs of Peru were noticed by Peter Kalm, a Swedish traveller, in the year 1750, and those of West Virginia and Ohio were described, in an article by Dr. S. P. Hildreth, published in "American Journal of Sciences and Arts," in 1826. Oil wells were drilled in West Virginia about 1810 and in Pennsylvania about 1860.

"Oil in Canada was first discovered by the Indians, floating on the water on Bear Creek, in the neighborhood of Petrolia, and the River Thames in the neighborhood of Bothwell. Indians gathered the oil by spreading blankets on the surface, and then squeezing the oil from the blankets. It was sold as a cure for rheumatism and other complaints. Oil in merchantable quantities was first discovered in Bothwell, about 1859 or 1860, at Oil Springs a little later, and at Petrolia shortly after."[1]

The first reference to natural gas in America appears to have been made by George Washington, who, in 1775, described "burning springs" in West Virginia, near Charleston, and in this same neighborhood (in 1841) William Thompkins was first to use natural gas, which he piped to his salt works and burned in furnaces under pans of brine to evaporate the water.

The following data regarding the discovery of coal in the United States is taken from a report of Edward W. Parker to the United States Geological Survey in 1909:

"So far as known, the first mention of the occurrence of coal in the United States is made in the journal of Father Hennepin, a French Jesuit missionary, who, in 1679, recorded the site of a 'Cole mine' on Illinois River, near the present city of Ottawa, Ills. The first actual mining of coal was in the Richmond Basin, Virginia, about 70 years after Father Hennepin's discovery in Illinois; but the first records of production from Virginia mines were for the year 1822, when, according to one authority, 54,000 tons were mined. Ohio probably ranks second in priority of production, as coal was discovered there in 1755, but the records of the production date back only to 1838. The mining of anthracite in Pennsylvania began about 1790, and it is said that, in 1807, 55 tons were shipped to Columbia, Pa. Reports of the anthracite coal trade are usually begun with the year 1820, when 365 long tons, 1 ton for each day of the year, were shipped to Philadelphia from the Lehigh region. Prior to this, however, in 1814, a shipment of 22 tons was made from Carbondale also to Philadelphia, and the production is considered to have begun in that year. It is probable that the actual production prior to 1820 was between 2,500 and 3,000 tons."

From the modest beginning of 22 tons in 1814, the production of coal in the United States has increased to approximately 484 million tons in 1910. The United States now leads the world in the produc-

1. American Gas Light Journal.

tion of coal and also of petroleum. In 1909 the world's production of coal amounted to 1,227,727,680 short tons, of which the United States produced 37½ per cent. It has been estimated by an eminent authority that, during the 100 years of coal mining in this country, only .4 of 1 per cent. of the available supply has been mined, leaving 99.6 per cent. still intact.

This country first appeared as an oil producer in 1859, with a total of about 2,000 barrels. In 1909 the production was 182 million barrels, which was 61 per cent. of the world's total. Of this quantity California produced 54½ million barrels.

The natural gas industry of the United States dates from about the year 1880, when the total value of natural gas used amounted to $200,000. In 1909 this had increased to $63,207,000; Pennsylvania leading the other States with a valuation of $20,475,000. The value of this business in California has increased, from $12,680 in 1889, to $447,000, in 1909.

The Introduction of Gas Lighting in the United States.—In the United States gas was first made in Newport, Rhode Island, although Baltimore, Maryland has the distinction of being the first city to build a plant and supply gas on a commercial basis. The following extract is from "King's Treatise on Coal Gas:"

"In the United States gas for illuminating purposes was first manufactured by Mr. David Melville, of Newport, R. I. Melville, who seems to have been a man of ingenious turn, hearing the reports of what was being accomplished in England, gave his attention to the subject, and, as early as 1806, had devised an apparatus by which he lighted his house, and the street in front, with gas of his own manufacture. This apparatus he improved from time-to-time, until, March 18th, 1813, it was finally patented by him. By its use he also lighted a cotton mill at Watertown, Mass., and the Wenscutt and Arkwright Mills, near Providence, and in 1817 it was employed in the Beaver Tail Lighthouse, this being the first application of gas to lighthouse purposes. It is said that the new mode of illumination was continued in the lighthouse for 1 year, giving great satisfaction, but, owing to the representations of the interested persons, who became alarmed at the unexpected success of the experiment, the new light was discontinued at the end of that time."

A description of Melville's apparatus was published in the AMERICAN GAS LIGHT JOURNAL, March 2, 1876. Gas was first exhibited in Baltimore in 1816, as an attraction at Peale's Museum on North Halliday street. On June 13, 1816, this announcement appeared in the *Baltimore American:*

"GAS LIGHTS.

Without Oil, Tallow, Wick or Smoke.

"It is not necessary to invite attention to the Gas Lights by which my Saloon of paintings is now illuminated; those who have seen the ring beset with gems of light are sufficiently disposed to spread their reputation. The purpose of this notice is merely to say that the Museum will be illuminated every evening until the public curiosity shall be satisfied.—REMBRANDT PEALE."

It is interesting to note that the building in which these experiments were made is still standing, and is now one of the landmarks along the thoroughfare that was at that time in the residential section, but is now almost wholly occupied by manufacturing concerns. When the Museum was discontinued, the structure was for a number of years used as the City Hall. Later it was used for a public school, and to-day it is occupied by the Construction Department of the Baltimore City Water Works. Peale's exhibition laid the foundation for the general use of this form of illumination, as the success of the demonstration immediately resulted in the formation of a Company for the manufacture of gas in sufficient quantities to light the entire city. The Gas Light Company, of Baltimore, was incorporated in 1821, and was the first Company in America to distribute gas for general use.

The Boston Gas Light Company was established in 1823, and the New York Gas Light Company in 1825. Philadelphia was lighted with gas on the 10th of February, 1836, twenty-one years after the subject was first taken up for investigation. The earliest reference to gas lighting in Philadelphia appears in the "Municipal Record," as follows:

"1815, Dec. 28th.—In Common Council: A letter from Mr. James M'Murtie, on the subject of introducing gas lights in the city, was received, read, and laid on the table."

On the same date, Dec. 28th, 1815, resolutions were adopted by the Common Council as follows:

"*Whereas*, gas lights have, by actual experience in the city of London, been found to cost less and to yield a better light than oil-lamps, and there is a good reason for believing that they may be introduced with advantage into the city of Philadelphia, as the materials for making the apparatus, and for preparing the gas, are abundant in the United States.

"Be it *resolved*, That a committee, of two members from each Council, be appointed to ascertain the facts, as far as they are able, relative to the effect and economy of gas lights and to procure for the use of the Councils, copies of such books relative to the subject of gas lights, as they may deem useful, and to consider the practicableness and expediency of facilitating and encouraging the use of them within the city of Philadelphia"

In 1817, Councils appointed a standing committee of three members of each Council, "To ascertain and communicate from time to time to Councils whatever facts relate to the improvements which may be made in the art, and to recommend, when they think proper, a plan for its introduction into general use."

Referring to these resolutions, the Trustees of the Philadelphia Gas Company, in a report dated June 30, 1838, wrote as follows:

"Whether the manufacture of gas could have been successfully established about that time or not, is a question of some interest, but upon which we have not sufficient data to decide. Experiments made then, or soon after, in Baltimore, New York and other cities, were very far from successful. The filth, the stench, the nuisance of various kinds, and the pecuniary losses attending those establishments, not only prevented our city from following the example, but they created on the part of a large, intelligent and respectable portion of our community, exercising, necessarily, great influence over our Councils, so deep-rooted a prejudice against gas lights as to prevent, for many years, the success of all applications to Councils to countenance them; and when finally the reaction in the public mind, chiefly in the younger portion of the community, forced that subject upon their attention, it produced one of the most exciting questions ever brought before them.

"It must be admitted, that the well-meant but injudicious apparatus established at the Masonic Hall, many years since, for supplying that building with gas (although altered, modified and occasionally improved) was by no means calculated to remove the objections of the opponents. In urging the introduction of gas lights generally, the friends of the measure were obliged to resort to evidence of success to the experience of Europe, discarding in a great measure that obtained either at home or in several of our neighboring cities. An application was made in 1826-27, by Messrs. Robinson and Long, for permission to lay pipes in the streets. This was declined.

"It appears to have been in the fall of 1830, that the discussion of the subject was again revived. A petition was presented by a number of gentlemen to Councils, asking them to sanction an intended application to the Legislature for a charter to incorporate a Company to manufacture gas for lighting the city and liberties of Philadelphia. The application was refused, but a committee of inquiry was appointed. Mr. Lippincott, who was a member of that committee, appears to have been from that time until his retirement from Councils, in the fall of 1835, an active, intelligent, and zealous friend of the measure.

"During the progress of these inquiries, several applications had been made by individuals or companies, for the privilege of establishing gas works at private expense, offering to Councils terms more or less advantageous to the public, but these were all declined; fortunately, as it has turned out, since it has resulted in the establishments of works which are believed to combine peculiar advantages. The present works being the private property of individuals associated for this purpose, there is a disposition to avoid those extravagant expenditures or unjustifiable extensions which are frequently the cause of failure and bankruptcy in works carried on at public expense."

A report of the Committee of Councils, dated January 1, 1833, contains the following notes in reference to the Baltimore, New York and Boston works:

"The Baltimore Company manufactures gas entirely from bituminous coal; the New York Company from rosin; and Mr. Robinson, of Boston, a gas from the two materials combined.

"The Baltimore Company, the oldest in this country, and who may be considered the pioneers in the gas works, both as to date and variety of experiments, originally constructed works for the manu-

facture of tar gas. This scheme totally failed, both as source of profit to the manufacturers, and convenience to the consumers. The gas afforded being too offensive for endurance, these works were abandoned, and new works, for the use of coal, were constructed by an English engineer, on a plan now used in some parts of England. The second set of works have in their turn given place to others, which produce gas with greater economy, and are now in successful operation. The gas is of an excellent quality, and, notwithstanding the great expense they have incurred in bringing the works to perfection, and in addition, the circumstances of their gas being burnt (*ad libitum*) without, in many instances, any restrictions as to the quantity burnt for the price paid, the stock of this Company is 35 per cent. above par, with a surplus fund, and paying 8 per cent. dividends. They furnish 3,000 private and 100 public lamps.

"The New York Gas Company's works were originally constructed for oil gas. Finding the material too expensive, rosin was substituted. They too have had their difficulties to encounter, and prejudices to overcome. That their gas has forced itself into favor, is clearly demonstrated, by the fact, that they now light 10,000 private, and 376 public lamps; under a contract with the corporation of the city to furnish gas for a certain burner specified, at the annual cost of oil expended on each of the residue of the city lamps, and which proves to give about 5 times the quantity of light that is afforded by each of the oil lamps upon which the price was predicated. The Company are losers annually between four and five thousand dollars on this contract, and yet their stock is 46 per cent. in advance of the par price. They annually lay by a considerable surplus, and pay 10 per cent. dividends.

"The want of economy in the consumption of gas in Baltimore has been noticed; the consumers generally pay by the burner which is defined. Each consumer uses as much as can pass the apertures in the burner, and frauds are committed by enlarging them. Having no motive for economy, the lights are used as long as it may be convenient, and no attention is paid to saving the gas.

"In New York and Boston, a different system has been adopted, by which the quantity consumed by each individual is accurately measured and charged accordingly. This is effected by an instrument called a metre, which is attached to the service pipe at the entrance of each house; this instrument is of tin, and of a cylindrical form, revolving in a case (air-tight) of the same metal. The inner cylinder, which is composed of four compartments of given dimensions, revolves in water immersed to a point a little above the axis; each compartment had two openings, one for the admission, and the other for the emission of the gas. As the cylinder revolves by the pressure of the gas, the compartment rising out of the water fills, which displaces the water it contained, while the other descending, refills with water, the gas passing upward through a discharge pipe to the burners. The axle of the revolving cylinder operates the gearing, to which clock hands are fixed, indicating on the dial the number of revolutions made, and consequently, the capacity of the cylinder being previously ascertained, the quantity of gas consumed is measured. The adoption of this system tends to the advantage of all parties. The consumer pays for no more than he uses, and consequently burns with as much economy as is considered consistent with his interest, and the producer not subject to the loss from carelessness or malice. The key of this meter is kept in possession of the manufacturer."

In Boston the first gas company was formed in 1823, but some time before this, James Robinson built a small works, on Commercial street, within the shadow of the Old North Church, immortalized by Longfellow in "The Ride of Paul Revere." Robinson used iron retorts and made gas from rosin; his distribution system consisted of mains of bored logs with gun barrel services. Sections of these old mains and services were dug up by Mr. E. C. Jones during his early experiences as Assistant Engineer of the Boston Gas Light Company. Although this Company received its charter in 1823, construction was delayed until 1828. The first plant was built on Hull street, and the first street lamps were lighted on January 1st, 1829, in Dock Square. At this time the Company's office was on Washington street. In 1837 the Boston "Almanac" described conditions at the works as follows:

"The gas is a compound of coal and rosin, and is esteemed for its brilliancy and illuminating power. There are three gasometers connected with the Company's works, two on Hull street, each 40 feet in diameter, and one on Washington street at the extreme south part of the city, of 80 feet. This is the largest gasometer in the United States and contains 15,000 cubic feet of gas. The roof over this building spans 102 feet and rests entirely upon walls without any support in the center."

During the 10 years, from 1850 to 1860, gas companies were formed in Brookline, Cambridge, Charlestown, Chelsea, Dorchester, East Boston, South Boston, Jamaica Plain, Newton, Roxbury and Worcester.

In New York, from 1823 to 1828, gas was sold at the rate of $10 per 1,000 cubic feet; in Boston, $5 per 1,000. The rate in Philadelphia in 1836 was $3.50 per 1,000; the first year that gas was distributed in Philadelphia, the sales amounted to 6½ millions cubic feet. In San Francisco, in 1855, the rate was $15 per 1,000. In the Semi-centennial Issue of the AMERICAN GAS LIGAT JOURNAL, published July 19th, 1909, the following data on rates appeared:

"In the beginning of 1863 (February) the average price of gas obtained by 420 United States companies was $4.06 per 1,000 cubic feet; the minimum was $2.50 per 1,000 by the Brooklyn, New York and Pittsburgh, Pa., companies, respectively; the maximum, $12.50 per 1,000, by the Marysville, Cal., Company."

At this time the extent of the gas industry in the new world is shown by the following figures (AMERICAN GAS LIGHT JOURNAL):

Date,	Location,	No. of Co.'s.	Capital.
July, 1860	North America	381	$47,911,215
Feb., 1862	United States	420	51,620,940
" "	British Provinces	23	2,112,040
" "	Cuba, Mexico and South America	19	6,500,000

Chronology of Early Gas Lighting in the United States.[1]

Year.
1697. First street lighting ordinance passed in New York City.
1757. Square lantern invented by Benjamin Franklin.
1762. First public oil lamps installed in New York City.
1816. First gas company incorporated in the United States. (Baltimore.)
1823. Second gas company incorporated in the United States. (Boston.)
1823. Third gas company incorporated in the United States. (New York City.)
1823. Gas lamps introduced in New York City.
1825. Gas lamps introduced in Brooklyn, N. Y.
1830. Manhattan Gas Light Company started.
1831. First Superintendent of lamps and gas appointed.
1853. Metropolitan Gas Light Company started.

Gas Lighting in Canada.—In Canada, Montreal was the first city to be lighted, about 1840 or 1841, followed by Toronto, in 1842. Gas was supplied at the rate of $4 per 1,000 cubic feet (contract plan) and the Company's rules were somewhat stringent, viz.:

"Lighting must not commence on any day until the sun has set, and all lights must be extinguished each night within 10 minutes after the hour contracted for. If otherwise, they will be held as used for an additional hour each night and for the quarter charged accordingly. In like manner, if the flame is allowed to burn higher than stipulated, a corresponding price will be charged, and if on any occasion more burning jets are used than contracted for, the additional number will not only be charged, but the offender will besides subject himself to the penalty provided by the statute."

Other cities were lighted as follows:

Halifax	1843
Quebec	1849
Kingston	1850
Hamilton	1851
Brockville	1853
Belleville	1854
London	1854
Ottawa	1854
Charlottestown	1856
Brantford	1857

The Introduction of Gas Lighting on the Pacific Coast.—This subject has been covered in an interesting paper, by Mr. John A. Britton, which was published in the AMERICAN GAS LIGHT JOURNAL, July 19, 1909.

The following extracts have been taken from Mr. Britton's paper:

1. From AMERICAN GAS LIGHT JOURNAL.

(*Continued on page* 298.)

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NEW YORK, MONDAY, NOVEMBER 6, 1911.

BRIEFLY TOLD.

THE KINGS COUNTY LIGHTING COMPANY TAKES AN APPEAL.—About a fortnight ago the Public Service Commission, for the Metropolitan District of New York, having heard testimony in respect of a petition by certain residents of the district of Brooklyn—that one supplied with gas from the mains of the Kings County Lighting Company—urging that they were overcharged, the decision favored the petitioners' contention. In the order subsequently (or forthwith) issued, the Company was directed that, beginning the 1st inst., the rate should be put at 85 cents per 1,000; and that, beginning January 1, 1913, the rate should be further lowered to 80 cents. The ruling figure was $1 per 1,000, and the district supplied, although its growth in population is now very rapid, was, as to its surface, largely devoted to farming produce, several of the farms comprising 100 acres or more. Of course, such a situation (as practical gas men will know at a glance), in its initial gas development, will show great sendout gains from year-to year, for say a 5-year period, it is nevertheless true that such gains are far from being as profitable as they would be were the gains in what might be termed a "finished field." Continuous new investments of considerable sums are at first required for additions to the distributing systems, and these additions shortly entail other investments on generating plant account, etc. All of which means, in many (if not most) cases, the borrowing of money on "running account," which is quite different in fact from original capital monies, that do not bear interest until the time that earnings warrant dividends—and this is especially true of the situation under consideration. However, to come back to the identical happening. The Company, through its counsel (Messrs. Morgan J. O'Brien and James F. Meagher), has served notice of appeal on the Commission, the keynote of the objection being in the assertion that the order of the Commission is "An impairment of contract and the taking of property without the due process of law, and a denial of the equal protection of the law."

THE COMMISSION CONSIDERS CHARGE FOR GAS SERVICE CONNECTIONS.—The Public Service Commission, First New York District, held a hearing last Tuesday, in New York city, on the complaint of several property owners as to the charge for gas service connections made by the Bronx Gas and Electric Company. This Company, which operates in a portion of the Borough of the Bronx, New York city, for some time past has made a minimum charge of $5 per service for work done inside of the street building line. The Company was represented by President Rosenquest, who stated that the expense of doing this work in all cases exceeded the amount charged. During his examination it was shown that this minimum charge was added to where the extra work done was excessive. Just what constituted an "excessive cost" was not stated, and Commissioner Maltbie (who presided) stated that unless all consumers in the same class were charged at the same rate discrimination was undoubtedly shown. President Rosenquest's plea that the Company did a great deal of work gratis upon consumers' premises, seemingly did not alter the case from the Commission's standpoint. The hearing was adjourned until the 6th inst., when a decision will probably be rendered.

OCTOBER MEETING, PHILADELPHIA SECTION, ILLUMINATING ENGINEERING SOCIETY.—The first meeting of the season of the Philadelphia Section of the Illuminating Engineering Society was held in the Assembly Hall of the Philadelphia Electric Company's building, 1000 Chestnut street, on Friday, October 20, 1911. The usual dinner preceding the meeting was held at Mosebach's restaurant, 929 Market street, 50 members and guests being present. The meeting, which was attended by 110 members and 58 visitors, was called to order by the Chairman, Mr. J. D. Israel, at 8 o'clock, who concluded his introductory remarks by introducing Prof. Sydney W. Ashe, of the General Electric Company, as the speaker of the evening. The Professor read an illustrated paper on the "Training of Commercial Men in the Fundamentals of Illumination," in which he gave a short history of the work which had been done in educating commercial men, by large corporations, stating that Germany was a pioneer in this work. In the second part of the lecture Prof. Ashe showed, by means of interesting experiments and lantern slides, the various steps taken in the education of the commercial man. The discussion was participated in by Prof. Rowland, Mr. Henderschall and others. The entertainment which followed the paper consisted of a series of excellent moving pictures, showing the manufacture of the Welsbach mantle; also the manufacture of the incandescent electric lamp. The exhibition provided, which consisted of a demonstration of electric meters and an exhibition of new appliances pertaining to the generation, distribution and use of gas and electric illuminants, proved of interest to everyone. The sessions were adjourned at 11:10 P.M., and all who attended these declared the meeting was amongst the most successful ones ever held by the Philadelphia Section.

DEATH OF MR. B. G. MCNABB.—The shocking news of the sudden death of Mr. B. G. McNabb, New Business Manager of the Montreal Light, Heat and Power Company, surely shows the frailty of life tenure. On the night of Thursday, October 19th, Mr. McNabb, accompanied by a friend (Mr. Fred. Boutillon) and four guides, left Montreal for a club house on the shores of Lake St. Peter, where it was proposed to hunt wild duck for two days. Friday was spent in that pursuit, and Saturday another try was made. About 3 P.M. of that day it was decided to return to the club house, from thence to return home, *en route* to the house (the party had 4 canoes and a motor launch for towing use.) Deceased, who was seated in the bow, with gun resting crosswise of the frail craft, tempted by the circling of a gull overhead, reached for the gun and drew it towards him. The stock in some manner caught on the seat and the motion that released it was sufficiently impulsive to turn it up. The hammers hit tips down, and, springing back, exploded the charges in both barrels, the contents passing directly through his body. Death, of course, was instantaneous. Immediately the body was secured, placed in the launch, and the unhappy party returned to the house. From thence the route was by water to the Town of Sorel. Here an inquest was held, directed by Dr. La Traverse. Of course, a verdict in accordance with the facts was rendered. On the arrival of the party in Montreal they were met by a delegation from the Company (Messrs. Carbray, Baird and Wilson), who, acting under instructions issued by President H. S. Holt, escorted the remains to the rooms of a local undertaker, where, the night of the 22d, a service for the dead was conducted by the Rev. J. E. Fee, of St. Mary's Church. At the conclusion of the services, which were attended by many of the Company's officials and almost the entire staff of its employees, the remains were removed to the Bonaventure station, for transfer to Battle Creek, Mich., where interment was subsequently made. Deceased was born in St. Thomas, Ontario, November 19, 1882, and when in his 20th year went to Chicago. Later on, or just prior thereto, his parents removed to Battle Creek, and it was from that city (1909) that he took service

with the Montreal Light, Heat and Power Company as New Business Manager thereof, the Company about 2 years prior having come into its present wise and progressive ownership. His success in Montreal was really wonderful, and he likely was the most well-known and best liked young business man of that ancient but swift growing business marts. He was a prominent member of the Canadian Gas Association—in fact, one of the attractions of its Hamilton (third) convention was a paper read and prepared by him for that meeting on the subject of "New Business Methods." It should have been remarked right prior to this mention, that much of his knowledge of salesmanship and ways of securing results in that line were gained from his connection with the General Gas Light Company, Kalamazoo, Mich. He was also identified with the Illuminating Engineering Society, the Michigan and Illinois Gas Associations, and the National Commercial Gas Association. His immediate survivors are his widow (who was Miss Schoup, of Battle Creek), a son, aged 4; and a sister, Mrs. Earnest Schoup. Deceased, in addition to his capacity as a business man, was possessed of a very winning personality, whose ways were those of one who walked along honorable paths, and whose instinct and practice were to help rather than hinder. The writer cannot better close this brief account of Mr. McNabb's short career than by quoting this sentence, in a letter recently to hand from a gentleman of prominent position on the staff of the Montreal Light, Heat and Power Company: " * * * Mr. McNabb was a man of tremendous energy, and he will be greatly missed in his department, and by all who knew him. He was also one of the most cheerful and affable men I ever knew."

CURRENT MENTION—

MR. CHARLES D. KELSO, of New Albany, Ind., has resigned from the Directorate of the United Gas and Electric Company, of New Albany, Ind. He has also resigned his membership on the Boards of several other public utilities of that district, and will again take up the practice of law. This resignation seems rather queer, remembering the prognostications of not such a long time ago, or when Mr. Kelso plunged into the vortex of public utilities business life. It was then asserted and declaimed that Mr. Kelso's ways were those of a man charged with wondrous "executive ability." Could it have been that he was surcharged therewith?

THE proprietors of the Southern California Gas Company have decided to accept without further demur the action of the City Trustees of the settlement of Whittier, Cal., in ordering a reduction of 15 cents per 1,000 in the gas rate there. It was $1.35; it is $1.20.

AT the second annual dinner of the Grass Valley (Cal.) Chamber of Commerce, held in Grass Valley, the evening of the 24th ult., perhaps the best speech of the occasion was that delivered by Mr. George Scaife, of the Pacific Gas and Electric Company.

MANY betterments are being made on the plant of the Derby (Conn.) Gas Company, not the least of which is to be the establishment of a good working example of the vertical retort system. The contract for the machinery and its installation has been awarded to the Isbell-Porter Company, of Newark, N. J., and the buildings will be erected by Mr. Max A. Durrschmidt.

SACRAMENTO, CAL., is considering the advisability of creating the office of City Inspector of Gas and Electricity.

THE American Society of Mechanical Engineers, at their meeting in New York (Tuesday evening, Nov. 14th, Engineering Societies' Building) will discuss "Autogenous and Electric Welding." Three papers on the subject will be presented, and the discussion is to be "grouped" about the following topics: "Electric Arc Welding;" "Thermit Welding;" "Electric Resistance Welding;" "Oxy-Acetylene Welding;" and "Oxy-Hydrogen Welding."

"B.," WRITING under date of October 27th, forwarded the following: "The State Board of Gas and Electric Light Commissioners held a continued hearing to-day on the resolution of the Legislature to provide for an investigation of the operation of demand indicators, used by electric light companies, with a view to determining whether or not it is expedient to regulate or prohibit the use of such meters. J. T. Auerbach, of Boston, representing a number of large users of current, contended that the Board should be vested with the authority of regulating these matters, and until something better had been found to take the place of the present instrument which was used to measure the quantity used. He believed that to take off the demand indicator would place the large consumer in unfair position, because a wholesale rate was given the large consumer, which could not be determined without the aid of the demand indicator. Until something better was discovered, the demand indicators should be retained. J. B. Eastman expressed the general proposition that a consumer was entitled to have knowledge that any device upon which depends in any way the amount which he pays was tested by public authority, and was accurate. He was not prepared to argue the question of differential rates for electricity, but said it was clearly a fact that demand indicators could be prohibited without disturbing the differential system. Mr. Child, of the Boston firm of Barton, Child & Co., presented to the Board the bills submitted to him by the Edison Company in similar periods last year and this. The former was $11, whereas the latter was $22.60. E. W. Burdett, representing the Massachusetts Electric Lighting Association, said his clients were not only willing but anxious that legislation should be passed which would give the Gas and Electric Light Commissioners full power to test demand indicators, and to require them to be kept at proper standard. As for prohibiting their use, his clients were very much opposed to any such legislation."

THE Stacey Manufacturing Company, of Cincinnati, O., has been awarded a contract for the construction of a storage holder up to retaining 1,000,000 cubic feet, by the proprietors of the Tacoma (Wash.) Gas Company. It is to be built on the tide-flat property owned by the Company on River street between the rights-of-way of the Northern Pacific and the Oregon-Washington Railroad and Navigation Companies. It is to rest in a concrete tank.

THE Gas Machinery Company, of Cleveland, O., has been awarded a contract for new water gas apparatus and tar extracting machinery to be installed in the works of the Lockport (N. Y.) Light, Heat and Power Company. This addition to the generating capacity of the Company is supplemental to the existing coal gas plant, and will place the corporation in proper way to meet the increasing demands of its patrons, both in respect of quality and service account. The close attention to business at this point of the Company's works' force, combined with the harmonious methods of the executive and office division, is working wondrously well in Lockport, if send-out comparisons with those of former years may be taken as the criterion.

"V. W.," writing from Beatrice, Neb., under date of October 28th, sends the following, which, he declares, speaks well for the eccentricities of the bosses (political) of Beatrice, in particular, and of the country in general: "At a meeting of the City Council, held this week, an ordinance was passed reducing the gas rate to $1.25 per 1,000 cubic feet—the Council might, of course, have done worse. The ordinance had, in one form or another, been turned down several times, as the Council had investigated the business of the Company and was convinced that it was not making a proper interest on the investment. What changed the opinion of the several members of the Council and made a change in rates possible is the fact that two Councilmen, Lenhart and Wheeler, are the Republican and Democratic candidates for Clerk of the District Court and are taking this stand against the Company. About a year ago the City Council appointed a committee to investigate gas rates. An expert bookkeeper was hired to check up the office, and Prof. Scipio, of the State University, was engaged to go over the data and state what would be a fair rate to all concerned. Prof. Scipio recommended that the rate be $1.56 and down, but instead of adopting his report, the Council made it $1.30. The Manager of the plant, Mr. Thomas Rice, states that his Company cannot pay expenses and furnish good service at the reduced price, and it is only a question of time before the Company goes into the hands of a receiver."

THE City Council, of Tuscola, Ills., has granted to Messrs. Jos. Young and A. E. Dunn, representing the American Construction Company, of Newton, Ia., a franchise to there construct and operate a gas works. The life of the agreement is 25 years, the rate (maximum) is $1.50, less 10 per cent. on settlement of accounts within 15 days; the candle power (minimum) must be 20; the distributing mains, wherever possible, shall be laid through the alleys of the city; and gas must be supplied within 1 year from the 26th ult.

THE shareholders of the Pacific Gas and Electric Company, of San Francisco, have assented to the Directors' proposition to increase the bonded debt to a maximum of $150,000,000, the capital stock to be put at a like limit.

(*Continued from page 295.*)

CHRONOLOGICAL.

1854.....San Francisco Gas Company.
1858.....Maryville Gas Company.
1860.....Portland Gas Company.
1867..... Los Angeles Gas Company.
1867.....Napa Gas Company.
1867.....Oakland Gas Company.
1868.....San Jose Gas Company.
1869.....Stockton Gas Company.

HISTORICAL.

Chico .....Wooden pipes used in 1852; benches, cast iron, cylindrical, 4 feet diameter, 7 feet long.
Oakland.....First installation, 3 iron retorts; gas made from pitch pine; connections, 3-inch.
Napa..... First installation, 1 iron retort; street mains, 3½ inches; boiler tubes.
San Jose..... Started with 10 consumers. Coal packed on mules from the most southerly point of San Francisco Bay.
Los Angeles ...Gas made from brea and wood, with occasional use of grape pomice. Amount of material used in 24 hours, ½ of a cord of wood and 1½ tons of brea.
Seattle, Wash...Original mains were bored logs. First holder tank made of cedar boards and still in existence.

"The difficulties encountered by the pioneers in the gas industry of the Pacific Coast can hardly be estimated by those engaged in similar industries on the Atlantic seaboard, or even in the central portions of the Western United States. With the exception of the States of Oregon and Washington, the Pacific Coast contained during those days no known raw material possible to use in the manufacture of gas by methods adopted in the Eastern centers; the coals of California and Nevada, New Mexico and Arizona are of the later periods of coal formation, being lignites or semi-bituminous, and possess no particular value for gas making purposes. Until long after 1849 the presence of very good qualities of bituminous coals in the States of Oregon and Washington was not known. The prohibitive prices of transportation in the earlier days of the Pacific territories prevented the use of coals, which were imported from either the Eastern States, England or Australia, for uses of interior State Companies, and while gas coals from Australia were available in the early '50s in San Francisco, the gas makers in the interior settlements were compelled to use wood largely for this purpose, the pine woods of the State yielding a very excellent quality of gas.

"As the natural consequence of its importance in the State, San Francisco was the first city to commence the manufacture of gas. Mr. Wm. Beggs, an engineer of prominence in the Eastern States, was the practical builder of the works of the San Francisco Gas Company, and gas was turned into the mains of that Company, February 11, 1854, through approximately 10 miles of pipe. Gas was made from Australian coal enriched by shale, for what seems to be now the fabulous price of $15 per 1,000. "Pete" Donohoe and Joseph G. Eastland, names revered among the gas men on the Pacific Coast, both of whom are now deceased, were respectively the President and the Secretary of that Company. The population of San Francisco in 1854 has been estimated at 25,000. From this small beginning the city has grown to a population of approximately 450,000, and from 10 miles of mains it has grown to 570, with 66,000 consumers upon its lines, and from a sendout of 25,000 cubic feet per day to a sendout of 15,000,000 feet per day, and from a price of $15 per 1,000 cubic feet to as low as 75 cents per 1,000 cubic feet.

"The manufacture of coal gas has, by reason of the cheapness of California oils, given place to what is known as the crude oil, water gas process, enlarged, simplified and made successful by the developments of Mr. E. C. Jones, the Chief Gas Engineer of that Company. This gas, in its characteristics, approaches very closely to the well-known coal gas of the Eastern States as the following analysis will show:

CNH_3N	9.8	O_2	0.2
CH_4	34.0	N	6.8
H_2	40.8	Sp. Gr.	0.475
CO	6.0	B.T.U.'s	722.0
CO_2	2.4	C. P.	24.3

"The manufacture of crude oil water gas is, in operation, practically that of carbureted water gas, eliminating only the use of anthracite coal or coke. The individual history of each company's methods throughout the State, its trials, tribulations, conquest over difficulties and gradual rise from nothing to prosperity would require a volume, and then would emphasize only the pluck of the pioneers in gas manufacture, most of whom have laid down the trials of this world for eternal peace beyond. Situated thousands of miles in either direction from the centers of population, void of manufactories to supply material, and dependent upon a transportation of from 6,000 to 14,000 miles, the earlier gas works of the State were built under conditions that would tax the energies of present time engineers; but the same spirit that built the State to the proud place it occupies in this grand Union of States, like Caesar of old, 'Came, saw and conquered.'

"The city of Marysville, located on the Sacramento river, below the junction of the Yuba and Feather rivers, comes second on the list of operating gas companies of the Pacific Coast. These works were operated, first, in the year 1858, and have since continuously supplied gas to its inhabitants. Marysville is a town of approximately 5,000 in population, and, while more prosperous and more largely peopled in the earlier days than now, by reason of its contiguity to large mining interests, it has become at the present time rehabilitated by reason of the fact of the establishment, near the city, of the largest gold dredgers in the world, and the surrounding country contributes to it, largely in agriculture.

"The city of Portland, Ore., often referred to by people of the Pacific Coast as the 'Finished City,' ranks third in number of the gas companies operating, the works there being started in the year 1860. The cities of San Jose, Napa, Oakland and Stockton, in the State of California, following between 1860 and 1867, the works at Napa, Oakland and Stockton having been built from the designs of Mr. Wm. Beggs, the designer and originator of the San Francisco Company.

"In Los Angeles gas was made from brea and wood, with occasional use of grape pomice; one-third of a cord of wood and 1½ tons of brea were used in 24 hours. In Marysville, Chico and San Jose, wooden pipes were largely used as conduits for gas in the earlier days due to the very heavy expense of cast or wrought iron. These wooden pipes were of various diameters, generally 6 inches in interior diameter. They were not wooden stave pipes, as such are commonly known, but logs of various lengths hollowed out, usually by burning the interior, necessarily making them a very irregular area and capacity. Some of these pipes are still in existence and carrying gas as they did 50 years ago. As stated before, the gas made in all of these cities was either from imported coals or from native woods. These processes have since been entirely abandoned.

"As the Pacific Coast has ever been ready to take advantage of any newer or more economical methods, carburetted water gas, made by the Lowe process, was first introduced in 1877, at the works in San Jose; Oakland in 1879; San Francisco and Los Angeles in 1887."

A very complete history by Mr. E. C. Jones of the introduction of gas lighting in San Francisco and other California cities found in the Pacific Gas and Electric Company's "Magazine," as follows:

Place.	Time.
San Francisco	August, 1909.
Oakland	September, 1909.
Marysville	October, 1909.
Vallejo.	December, 1909.
Sacramento	January, 1910.
San Jose	February, 1910.
Napa	April, 1910.

Mr. Chas. L. Barrett has written an interesting chronological history of gas and electric lighting in San Francisco, which appeared in the Pacific Gas and Electric Company's "Magazine," dated December, 1910.

The development of gas lighting in the United States has kept even pace with the rapid growth of the country. Returns to the Geological Survey covering the production of coal gas, in 1908 by 506 companies, show a total make of 56,944½ million cubic feet; and the oil and water gas production for 1908 amounted to 110,237 million cubic feet. The dates of the introduction of gas in the principal cities of the United States are as follows:

Place.	Time.	Place.	Time.
Newport, R. I.	1806*	Philadelphia, Pa.	1836
Baltimore, Md	1821	Pittsburgh, Pa.	1836
Boston, Mass	1823	Cincinnati, O.	1840
New York, N. Y.	1825	Manchester, N. H.	1841
Brooklyn, N. Y.	1825	St. Louis, Mo.	1846
Louisville, Ky.	1832	Fall River, Mass.	1847
New Orleans, La.	1833	Newark, N. J.	1847

*Experimental,

Place.	Time.	Place.	Time.
New Haven, Conn	1848	Memphis, Tenn	1852
Paterson, N. J	1848	Milwaukee, Wis	1853
Providence, R. I	1848	St. Joseph, Mo	1854
Rochester, N. Y	1848	San Francisco, Cal	1854
Washington, D. C	1848	Toledo, O	1854
Buffalo, N. Y	1848–49	Atlanta, Ga	1856
Norfolk, Va	1849	Scranton, Pa	1857
Cleveland, O	1849	St. Paul, Minn	1857
Detroit, Mich	1849	Portland, Ore	1860
Syracuse, N. Y	1849	Kansas City, Mo	1867
Utica, N. Y	1849	Los Angeles, Cal	1867
Chicago, Ills	1850	Oakland, Cal	1867
Columbus, O	1850	Omaha, Neb	1868
Hartford, Conn	1850	Minneapolis, Minn	1871
Worcester, Mass	1850	Seattle, Wash	1873
Indianapolis, Ind	1852	Tacoma, Wash	1885
		Spokane, Wash	1887

Address of President Clare N. Stannard, Seventh Meeting, National Commercial Gas Association: Denver, 1911.

Mr. Chairman and Gentlemen: Your Denver and Western friends take pleasure in welcoming into their midst the members of the National Commercial Gas Association. We have spent months in arranging the features of the convention, exhibition and entertainment programme, which we trust will meet with your approval.

In keeping with the past custom, your President has prepared a report and some recommendations which he herewith presents.

Your Board of Directors has held meetings during the past year in Boston, Chicago, New York and Denver. The meetings were enthusiastically attended and a vast amount of work was planned and executed, the details of which have been fully mentioned in the Directors' and Secretary's reports. It was impossible to hold additional meetings on account of the Directors being so widely scattered. I would suggest that, if possible, in the future Directors be selected nearer the residence of the President, so that frequent meetings can be held without a great expenditure of time and money.

In our estimation some of the most important things accomplished during the past year by the officers and committees are as follows:

The "Accounting and Relations with Consumers' Committee" has performed a splendid work during the past year through the columns in the bulletin and question box department. We have an important duty to other than the commercial men, and the committee has been meeting this duty by presenting and handling many subjects of vital interest.

The "Industrial Fuel Committee" has compiled material which, when published, will be of inestimable value to the gas fraternity in the advancement of the sale of gas for industrial purposes.

"The Advertising Committee" and the Board of Directors have spent much time over an advertising proposition fully explained in the Directors' report. The plan contains much merit and should have the hearty support of all the members.

"The Transportation Committee" is the first one of its nature appointed in the history of the Association, and through it we have secured an immense amount of favorable publicity. The Committee was of great value in formulating and distributing transportation information, all resulting in our members being provided with every comfort and splendid service in their journey to Denver.

"The Committee on Papers" worked long and earnestly, submitting an excellent list of authors and papers to the Board of Directors, who co-operated with the Committee in making the final selections. The subjects cover a wide and varied field, and, as the authors are all experts upon their respective subjects, when the papers are presented I trust we may have a full and complete discussion.

The "Membership Committee" has labored long and earnestly and materially increased our membership. Company sections have been formed in many parts of the country, more recently in a number of large and enthusiastic ones on the Pacific Coast. In fact, Western interest and membership have increased according to our prediction when Denver was selected as the convention city. We are convinced that the future rapid growth of the Association lies in the formation of Company sections, and would recommend that next year special attention be given to the formation of State and company sections.

From the experience of the past year, fully described in the Directors' report, we would further recommend that someone possessing the proper qualifications be employed to visit many of the large Companies, personally explaining to the management and employees the advantages accruing to both from the formation of company and State sections.

In December, 1909, at the Chicago Convention, President Frueauff recommended the publication of a "Bulletin." The suggestion was properly acted upon: The beginning was, as recommended, modest, the growth has been gradual, until at the present time the members have good reason to be proud of their official publication, and it is hoped that in the future the "Bulletin" will receive from our members the hearty support it deserves. Thus it will continue to be of increasing value to all departments of the gas industry.

The Board of Educational Control is a new departure, originating with the present administration. It is doing a most important work and creating an influence which in the future will be clearly noticeable in the work of the commercial men. The success of the salesmanship course is assured; a large membership has been secured, and the work of the Board marks a new era in the history of the gas commercial world. A recent editorial written by one of our friends speaks as follows regarding the work of this Board: "The work of the National Commercial Gas Association is assuming a practical and helpful character that is destined to have a great influence in helping to shape the destiny of the gas industry, and therefore *deserving of support*. The most recent enterprise they have launched out with is a scientific salesmanship course for the members of their organization only.....There is a Board of Control, consisting of nine well known new business specialists, and this alone promises well for the efficiency of the course they supervise."

When Denver was proposed as the convention city, in some quarters objections were raised, stating that it would be difficult to interest many manufacturers in making an exhibition on account of the distance. The assertion has been most thoroughly disproved. Look in the adjoining room, and all the representative, progressive manufacturers are to be found, all our friends. Those we should patronize. Let us show our appreciation by making this exhibit a record breaker through the placing of orders. The complete display and magnificent exhibition arranged by the Exhibition Committee and manufacturers provide many educational features, and show continual progress in the illumination field and the application of gas both for domestic and industrial purposes.

Western members are appreciative, and will continue to show their appreciation by their presence and by the purchasing of appliances. The Exhibition Committee when planning the exhibition had in mind the fulfillment of Section 4, Article 2, of the Constitution, which says: "A substantial recognition of the value of the gas appliance manufacturer to gas interests, and the encouragement of closer relations between the sales' division of the gas industry, the manufacturers of gas appliances, and dealers in gas appliances." Therefore, in order that all interests may be best served, Wednesday afternoon has been set aside that we may view and examine the exhibits, and it is hoped that our members will without fail spend the entire afternoon in the exhibition hall.

The "Convention and Entertainment Committee" has arranged a programme which we trust will be especially attractive to our lady guests, not for a moment forgetting the gentlemen. The Committee, realizing that oft-times the most vivid and lasting impressions of a convention are those furnished by the entertainment, has arranged a programme which is a combination of novelty and western hospitality.

Objects of the Association.—Section 1, Article 2, of the Constitution reads: The objects of this Association shall be:

First.—The development of the use of gas and the promulgation of methods necessary for its sale.

Second.—To encourage the manufacturer to furnish suitable appliances for the use of gas for light, heat and power.

Third.—The establishment and maintenance of a spirit of fraternity between the members of this Association."

My thought in calling your attention to the objects of our Association is that we pause to consider why we are here, and why we expect to give the new administration our hearty support and co-operation during the coming year.

We are now truly national in our work: Besides having many members in all parts of the United States, we have a membership in Canada, Mexico, England, Japan, New Zealand, Hawaii and other foreign countries. Thus we have an opportunity of taking national strides in commercial advancement, making our Association a power

in the gas manufacturing and gas selling world, advancing our own individual and collective interests, and better serving our consumers through an improved and more complete service, and through increased sales lessen the price of our commodity.

I wish we might more generally interest and secure workers from the smaller companies, who apparently, through a lack of time, or the companies' unwillingness to have their employees spend the necessary time and money, have not given the co operation desired, though, as the work of the Association becomes more widely known and appreciated, we hope to overcome this obstacle.

Education.—It is the crying need of to-day. High school, college, technical experts; then the application, which is the key-word of success. When the proper foundation has been laid, coupled with application, intelligent industry and intelligent direction, we then have the successful combination.

Realizing our Association should be of real, permanent benefit to its members, the Board of Educational Control, before mentioned, composed of recognized commercial experts and leaders of the world, supplies to one possessing a fair education the means of ultimately qualifying as a commercial expert. Members of our Association connected with the smaller companies have thus been given an opportunity of gaining knowledge heretofore impossible. Thus we believe this educational field of our endeavor is meeting a long felt want

Broadening of Our Field.—Originally gas was used for simply the lighting of the residence or store, supplied at what now seems an excessive price; then the domestic field was exploited, later came the power and industrial applications, and now we have a combination of all the above, thus wonderfully increasing our field of usefulness. In a recent compilation it was found gas is very successfully being applied in 704 different ways. Our gas output has been wonderfully increased through the magnificent strides made by the manufacturers of both lighting and industrial appliances. Consider the lighting effects produced in the exhibition hall with those produced 10 or 15 years ago. Again, consider the application of gas for industrial purposes with the same period, and we find that marvelous progress has been made. Think of the open flame, and compare it with the incandescent or inverted burner, used in connection with the artistic fixture, and note the splendid effects secured, the high candle power, the excellent distribution of light and the low cost of service.

Consider the growth of domestic fuel. Originally the hot plate and oven, then the one oven cooker, the double oven stove, the elevated range and now the elaborate cabinet.

Note the progress made in the water heater field until we have the efficient circulating, instantaneous, and finally the storage water heater. We believe that the power and industrial fields offer the greatest opportunity for continued increased sales. Many papers have been written how to develop the gas field, and will simply mention that the industrial manufacturer desiring to apply gas is often more interested in service and convenience than mere cost, and through efficient appliances supplied us by the appliance manufacturer, we are enabled in many instances to secure this business even though the gas costs more than other fuels.

We should not, however, be contented with the progress thus far made, for were we to rest on our oars, even for a moment, we would find that other forms of illuminants and fuels would immediately be presented to our prospects and consumers, which, if ignored on our part, would lead to serious competition. We should, therefore, keep in close touch with the light, power, domestic and industrial fuel situations, being ever on the alert to protect our interests.

Ownership.—Public utility corporations may be owned and operated in many ways, but we will only mention the three in general practice at the present time. First, private ownership; second, municipal ownership; third, private ownership with municipal control of rates.

Many instances might be cited which prove conclusively that private ownership is the most satisfactory of these three. Wherever a privately-owned company, operating under a system of reasonable and proper rates, gives good service and has due regard for the just treatment of the public, we are of the firm belief that there will never be a demand for a change in ownership.

In a recent editorial some statistics were given which are of great interest. We were told that the corporations are not owned by simply a few men of vast wealth using their power to oppress the people, but that on the other hand a great number of plain people were the owners of the corporations; and statistics were quoted showing that 7 large corporations, such as the United States Steel Corporation, the Pennsylvania, the New York Central and Santa Fe Railroads, the American Telegraph and Telephone, and other companies are represented by a total of 321,000 stockholders, a large portion of whom were women, and that the majority of stockholders were persons of moderate means. Another interesting fact is that since the panic of 1907, individual owners of the leading railroads and industrial corporations have increased from 50 per cent. to 60 per cent., and it is estimated that the stockholders of the various corporations represent a total of 2,000,000 people, or about 1 of every 20 adult men and women of the land. Thus the tendency is growing throughout the world towards co-operation, amalgamation and consolidation, and we believe, from the facts and statistics presented, that, where a corporation deals fairly with the public, there will be found no demand for municipal ownership or control; and it is here, gentlemen, that we should remember Section 3 of Article 2 of our Constitution, which reads: "The inducement and extension of more cordial and friendly relations between consumers and producers of gas, based upon mutuality of interest."

The Association's Future.—This is the Seventh Annual Convention, the first combined gas exhibition and convention in the West. The West needs it and the Association needs the West. We believe the results accruing from the convention and exhibition held in this portion of the country can hardly be estimated. Therefore, in keeping with this thought, I recall that last year, at the Boston meeting, we received an invitation from the Pacific Coast Gas Association inviting and urging us to meet in San Francisco during the Panama Exposition, 1915, at which time a World's Congress of gas men is to be held. I would recommend that our Association accept the invitation and that we make our plans to hold our convention and exhibition during that year in San Francisco.

The Association's growth from the beginning has been steady and rapid. We now have the largest gas association in the world, our membership representing 3,000 persons, and this number will still increase and we will, no doubt, in the near future double our present membership.

On account of the present limitations of the Association's Constitution and by Laws, together with lack of funds, which even to-day, gentlemen, hamper the progress of our Association, many things absolutely imperative and necessary to the good of the gas industry are being neglected. Citing some of the most important instances, I would quote, under "Suggested Work," taken from "Comments for Sub-Committee on Plan and Scope of the Public Policy Committee of the National Commercial Gas Association," the following:

To take steps to see that all litigation of a general character which might produce precedents which would govern the entire business is followed up, and see that this litigation is properly defended or prosecuted as our interests may require.

To demonstrate the fallacy of limited-term franchises.

To correct antagonistic public feeling against gas companies, especially by educational methods where this antagonism is the result of popular error.

To maintain the credit of gas securities with the investing public.

To avoid the further adoption of the double standard of candle power and calorific value.

To convince the public of the fallacy of special taxes on gas companies.

To keep in touch with scientific or public movements which may have an effect on the gas business.

To standardize the sizes of coke placed on the market and secure the adoption of uniform names to designate each size of coke.

To secure the offer of premiums or awards for applying gas coke or tar to new uses.

To encourage the development of coke consuming appliances.

To secure standard methods for testing fuel gas appliances.

To encourage the development of appliances by securing suitable awards for novelty, excellence and efficiency of fuel gas appliances.

To encourage research work.

To my mind the above list of work to be accomplished proves conclusively that immediate steps should be taken to perfect an organization strong enough financially as well as numerically to effectively accomplish in due time the work outlined.

Believing the time is now ripe for the National Commercial Gas Association to take on added responsibilities and duties, materially increasing its field of usefulness, greatly broadening its scope of work, becoming of greater value to its members, the appliance manufacturers and the broad gas industry, to this end I take advantage of

a paragraph in Article 2 of the By-Laws, which, in part, reads as follows: "At each annual meeting the President shall make such recommendations as he may deem advantageous to the Association." Therefore, I recommend that we change our Constitution, sufficiently broadening its scope to permit the accomplishment of the work above suggested; and, that further, we should at this time, in my judgment, provide for the creating of company membership, the revenue to be derived from this new form of membership, together with our present source of income, would then place at our command sufficient funds to carry on the proposed new work of the Association.

I have carefully discussed these recommendations with many of the leading commercial men, engineers, superintendents, general managers and stockholders of the gas industry, and it is the unanimous opinion of all that the time is now ripe for us to make these changes, thus enabling the Association to fully meet the requirements of a complete and perfect Gas Association in all its various phases and details. I would, therefore, further recommend that a committee be appointed to work out in full the necessary details for the fulfillment of the plans proposed and that they report their recommendations to the next convention.

Conclusion.—I wish to thank my fellow officers, directors, committeemen and members who have so unhestitatingly spent much of their time and effort in furthering the Association's interests, and the trade journals and newspapers who have given us widespread publicity and have, therefore, materially aided the Association during the past year in its growth, prosperity and progress.

The Leskole Recording Gas Calorimeter.

The *Gas World* having noted that "Whether a calorific test of gas will be substituted for the present photometric test is a matter of high gas politics that the future will decide," then goes on to say: But in the meantime more and more attention is being given to the calorific side of testing, and manufacturers are doing their best to provide gas engineers with the needful apparatus. The latest candidate for favor in this country among recording calorimeters is the "Leskole," which is a modification of the instrument invented by Dr. Fahrenheim, Chief Engineer of the municipal gas works, Essen, Germany. The apparatus has been improved and adapted to English conditions, employs no liquid of any kind, and the whole of the apparatus is inclosed in a small portable case, it cannot be influenced by draughts, etc., perfect combustion being secured by automatic air regulation. A simple capillary takes the place of delicate escapement gears. The instrument is designed for continuous work without attention.

The gas enters the calorimeter at 1 (Fig. 1), and first passes the governor, 2, which serves to balance fluctuations in pressure. Leaving at 3, the gas is next pressed through a system of capillaries, 4. This, in conjunction with the auxiliary burner, 5, regulates the flow of gas, so that variations in specific gravity do not influence the volume of gas furnished to the burner in a unit of time. At 6, the gas enters a specially designed meter, 7, by means of which the calorimeter is adjusted to the correct flow, and thence the burner, 8, is reached. The air for combustion is supplied through the valve, 9, which adjusts itself automatically, in accordance with the temperature of the exit gases, so that perfect combustion is always maintained. A secondary stream of air enters at 10, mixes with the waste gases, and passes upward through the casing, 11. This casing contains the pyrometer, 12, which, when heated by the gases, expands, thus operating the pen gear. The degree of expansion is a direct measure of the heat value of the gas, which is shown on the 24-hour chart, 14, directly in B.T.U.'s. After passing the pyrometer, the gases turn downwards through the outer jacket, 15, and out, at 16, through chimney, 17. In this way, the pyrometer casing, 11, is kept at a high and constant temperature, so that it cannot be affected by atmospheric changes.

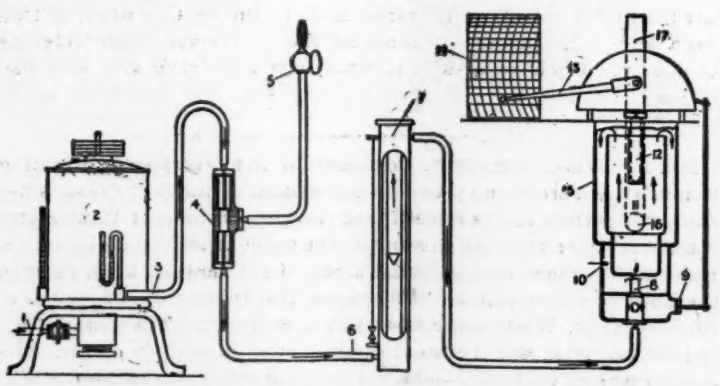

Fig. 1.—Diagram Showing Action of Calorimeter.

Fig. 2 shows the apparatus inclosed in its case, and demonstrates the justice of one claim made on its behalf, namely, its compactness. Other claims to the favor of the gas engineer are its simplicity of construction and its moderate price.

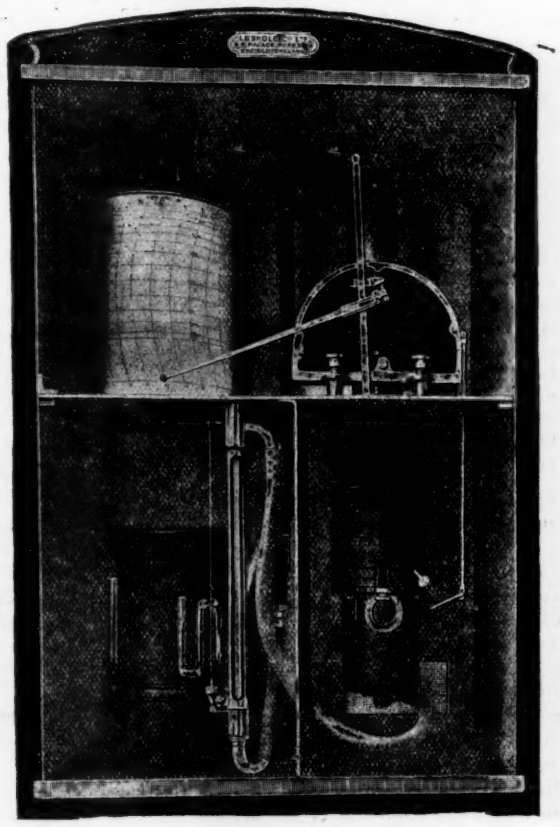

Fig. 2.—Leskole Calorimeter Inclosed in Case.

Utilizing Waste Coal.

Our Consular representative in Hull, England (Mr. Walter C. Hamm), in a recent communication to the Home Office, respecting the subject named in the heading, declares that an illustration of the feasibility of using waste coal for power purposes has just been given in Hull, one of the new patent water-tube boilers having been installed in an oil mill in that city. The success of a public exhibition given shows, it is claimed, that much coal which has heretofore been rejected as worthless can be used, and that greater efficiency can be obtained from this waste coal by the new method than from the best coal by the old method.

The system employs the known principle that almost perfect combustion can be obtained by mixing air in proper quantities with pulverized coal before the latter is introduced into a furnace. This insures better combustion, with less air than usual, and with a consequent increase of boiler efficiency by reducing the amount of heat carried away by the escaping gases. The results obtained with the poorest kind of fuel are claimed to be as follows:

(*a*) The almost total elimination of losses, as all the fuel is burned in suspension, the amount of unconsumed coal in the furnace at any given time being infinitesimal.

(*b*) The rapidity with which steam is raised under ordinary con-

ditions. The system differs from others in that with ordinary furnaces some time is taken before the fires are completely alight, but in this case as soon as the boiler is fired theoretically, full effect is obtained.

(*c*) The smallest and cheapest kinds of "slack" are burned with ease, and high efficiencies are obtained.

(*d*) The arrangements which permit a close inspection of the straight vertical tubes.

(*e*) The reduction of supervision necessary.

Coal dust costing $1.25 a ton, which could not be utilized in any other way, was burned under this boiler and gave equal efficiency as compared with coal costing $2.50 a ton and used with the old style of boiler. The boiler can be started and stopped by holding the fire up in 1 minute. In 26 minutes a steam pressure of 180 pounds can be obtained, whereas it takes about 4 hours to fire a boiler of the old style. At meal times the fire can be cut off and a great saving of coal effected. An additional advantage is that the space occupied by the boiler is considerably less than that required for the ordinary boiler.

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

Improved Washer-Boxes.—Bulletin 202 B, from the press of the Western Gas Construction Company, is devoted to a clear, illustrated description of an improved design of washer-boxes. The various details are illustrated and explained in concise and readable manner. The October stock list of valves and pipe specials is also ready for forwarding upon request.

Gas Heaters.—The Geo. M. Clark Company has ready catalogue 83 covering its complete line of heaters and radiators.

Glassware.—Globes, shades, chimneys and reflectors in great variety are beautifully illustrated in catalogue 16, of the Haskins Glass Company.

Carbureted Water Gas Apparatus.—Bulletin 316, of the Gas Machinery Company, contains a description of its apparatus, with special reference to the central oil spray and blast in top of carburetor. The description of the operation of the machine would do credit to a standard work.

Sampling and Analysis of Gases.—The United States Steel Corporation has issued, in pamphlet form, the methods used by that Company for the technical sampling and analyses of gases.

Firebrick.—The Union Mining Company has included in its catalogue on water gas firebrick considerable data on brickwork, water gas operation and general engineering tables.

Gas News.—The Consumers Gas Company, of Toronto, Can., publishes, under date of November, the 12th number of its monthly leaflets on gas and gas appliances. The Company has also issued an attractive pamphlet on "Modern Home Lighting."

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 10 cents.

1,006,588. Gas Tube Tip. A. W. Nicholls, East Norwalk, Conn.

1,006,797. Gas Producer. A. Rusbatch, Cleveland, O.

1,006,826. Carbide Indicator for Acetylene Generators. H. C. Buschmann, Indianapolis, Ind., assignor to The Jenne Acetylene Gas Machine Company, same place.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. E. F. LLOYD, President of the Lloyd Construction Company, Detroit, Mich., writing to us under date of the 26th ult., says: We notice an error in your mention (Page 255, JOURNAL, October 16th) of the award of the contract for the construction of three 25 by 30, by 15 feet steel-concrete purifiers, to be erected at Lockport, Ills. This work was awarded us by Mr. H. Koppers, constructor of by-product coke and gas ovens, Joliet, Ills.

MESSRS. O. M. HARLAN, A. E. Russell and W. M. Hess—all of Philadelphia—have made application for a charter, under which they propose to build a gas plant for the supply of gas to the residents of Hereford, Washington, Longswamp, Maxatawny, Richmond, Ruscombmanor, Rockland District, Fleetwood, Kutztown and Topton, all of Bucks county. Its corporate title is to be that of the Kutztown and Topton Gas Company.

DURING the quarter ended 30th September, the United Gas Improvement Company sent out from its Philadelphia works 1,995,615,100, cubic feet. This is an increase of 62,818,400 for the period; and the increase for the three quarterly periods of the year then ended amounted to 175,251,070. The royalty payment for this quarter to the city footed up $296,614.

"A VERY interesting lot of 'coming business men,' in the persons of the students in the Chemistry Class of the Waltham (Mass.) High School, recently visited the works of the New England Gas and Coke Company, and of the Boston Consolidated Gas Company, Everett, Mass. There they witnessed the plan of apparatus and the details of manufacturing procedure. They were under the guidance of their instructor (Mr. C. W. Goodrich), and their expressions over some things that they saw were, though naturally varied, always indicative of wonder. Each of the visitors is now at work preparing a report (to be made to Mr. Goodrich) of that which they saw.—B. V. B."

MR. EDWARD L. RIEHA, and associates, of Baltimore, Md., are the proprietors of a franchise to construct, own and operate a gas works in the city of Sumter, S. C, the grant to cover a period of 50 years. The works will likely be in operation some time in January. That Sumter is a hustling city would seem to be shown in the fact that not long ago its citizens raised the sum of $500, 000, to be used in the construction of church edifices, a new building for the Y. M. C. A., and other public undertakings. The last census showed it had 8,109 inhabitants, and the capital stock of the 5 local banks had been increased to $550,000 (1911) from $175,000, in 1906.

MR. E. E. MCDONALD has resigned from the service of the Bennington (Vt.) Gas Light Company.

"R. A. V.," writing from Chicopee, Mass., under date of October 26th, says: "I have seen no mention of recent changes in the Berkshire district gas forces, and forward the following, as likely to be acceptable: Mr. James C. Turner has been promoted to the place of Cashier for the North Adams Gas Light Company. Miss Bastien, who did occupy the positon of Cashier for some time, has been appointed Secretary to Manager B. K. Cook. I have not heard who was named to the post of Superintendent."

MR. C. E. UMMACH, for many years with Messrs. R. Williamson & Co., of Chicago, has purchased the business heretofore operated under the title of the W. S. Edwards Manufacturing Company, of Chicago, and will operate the same as the Universal Manufacturing Company. The concern will manufacture a varying and wide line of gas and electric fixtures, with headquarters in 65 East Lake street, Chicago.

MR. FRANCIS A. STRATTON, President of the Westchester Lighting Company, is surely an up-to-date business man, and perhaps no other real estate expert in the central and eastern sections of Westchester county is better qualified to estimate the value of real estate locations. He is now engaged in developing a plot of 230 acres of land, right in the heart of which will be constructed the Quaker Ridge station of the New York, Westchester and Boston Railroad. The plot is north of New Rochelle, and it is so disposed that it is high in center, sloping to east and west, with splendid drop for natural drainage layout and construction. Mr. Stratton will name the "development" Quaker Ridge, and the plan for its final distribution insures that it will become a handsome residential section. Thus does the President secure new and useful consumers along the extending lines of the Westchester Lighting Company's mains.

ALL the properties of the Winnipeg (Manitoba) Electric Company, which corporation had complete control of the gas, electric, railway and power service of Winnipeg and the surrounding districts, have been purchased by the E. B. Rease Engineering Company.

AT a maeting of the Water Commissioners and Board of Selectmen, recently held in Westfield, Mass., Mr. C. W. Whitney, of Boston,

was chosen Clerk. Mr. Whitney, who is an expert accountant, has for some time been engaged in an attempt to audit the books containing the accounts of the Commissioners in charge of the Municipal Lighting Department (gas and electric) of Westfield.

THE handsomest business structure, and the busiest place as well, in Atlantic City, N. J., are the offices and showrooms of the Atlantic City Gas Company, at Michigan and Atlantic avenues, which were opened to the public last month—"palatial, new home" is a clause in one of the sentences describing it as printed in the Atlantic City *Press*. In the great number of things carried for display, perhaps the most notable is an example of a "Modern All Gas Kitchen."

ONE of the oddest uses to which a receipted gas bill was ever put is reported from Los Angeles, Cal. Early last month this message, written on the back of the bill, was handed in to Judge Reves, of the Probate Court, by B. S. White, a relative of the signer, praying for letters of administration over the estate of one Mrs. Lydia A. Garber: "I want everything to go to Regina Tillett. Don't blame.—L. A. Garber." It should have been earlier mentioned that deceased was a suicide, through having inhaled illuminating gas. The beneficiary is a niece, residing in Pittsburgh, Pa., and the estate is valued at or about $15,000.

THE Pnblic Service Gas Company, of New Jersey, is piping the territory between Old Bridge to Spotswood, thence on to Jamesburg—this in its New Brunswick section. And this mention recalls the fact that the Company is likely doing more pipe extension work than any other Company in the East.

THE advent into Morrisville, Pa., of the Bucks County Public Service Company is also being marked by a plenty of pipe laying. Besides the Morrisville lines, others are being carried to and through Newtown, Yardley and Langhorne.

"THIS is what we we think of Boss Chewning," writes I. C. M., from Reading, Pa., under date of the 24th ult., "as expressed in these resolutions adopted at a meeting of the Consumers Gas Company, of this city:"

"It is with much regret that we announce at this meeting that one of our superiors, Mr. Chewning, is about to leave us to accept a position of greater trust and responsibility. He has been here as engineer for about two years and in that time he has shown his ability to meet any occasion that has arisen, and with his untiring persistence has brought the distribution department up to a standard which is highly appreciated by the home office.

"Mr. Chewning has never worn his heart on his coat sleeve, but at any time help or sympathy was needed he was always ready to extend a helping hand and decided all questions with justice and impartiality. He has shown himself to be a thorough gentleman at all times, and any time he may care to visit his old field of labor he will always be accorded a hearty welcome."

THE annual meeting of the Springfield (Mass.) Gas Light Company was held in its main offices the afternoon of October 24th. The shareholders were well represented, and they certainly had no reason to be disappointed over the results of the year's working as shown in the annual reports. The Directors elected were: Chas. H. Tenney, C. L. Goodhue, Fred. H. Harris, W. G. Wheat, Al. P. Tenney, Horace Wood, Herbert C. Warren, B. E. Helm, E. M. Bradley and Saml. York. The Directors subsequently perfected the following executive organization: President, Chas. H. Tenney; First Vice-President, Albert P. Tenney; Second Vice-President, D. E. Manson; Treasurer, Eugene Milliken; Assistant Treasurer, W. H. Bradley; Clerk, Chas. H. Wood.

THE inevitable has come to pass, and the municipality of Hamilton, O., may lay unto itself the flattering unction that it has put into bankruptcy a corporation which was one of its best taxpayers, and caused serious financial loss to many of its citizens through investments in the bonds and stocks of a corporation that started active work under the strength of a franchise and charter granted by the authorities. This above will serve as an introduction to a despatch published at the instance of the *Associated Press:* "Because the competition of a municipal gas and electric plant had become so strong and keen as to be disastrous, the Hamilton Gas and Electric Company has filed a voluntary petition in bankruptcy in the U. S. District Court. The petition was accompanied by an application for a receiver to continue the business so that the consumers will not suffer. The schedules show: Liabilities, $1,013,856; appraised assets, $536,603."

GENERAL MANAGER R. M. REDDING, of the Macon (Ga.) Gas Company (for such is the exact title of the corporation that has succeeded to the business of the old Macon Gas Light and Water Company, in so far as lighting is concerned) reports that business is brisk. The water division of the old Company's trading was taken over by the city early last month for operation on municipal account. Since the divorcing completely of the two branches of supplies so intimately appealing to the needs of the public, Mr. Redding has been enabled to do much towards putting the gas plant in a condition where it may successfully respond to the increasing demands that are being made on it. The generating advances consist in the perfect restoring of 2 benches of 6's and the construction of a 6-foot water gas set, by the Gas Machinery Company, of Cleveland. A new 125-horse power boiler was also placed. Several miles of mains have been added to the distributing system. In fact, everything about the works is now in excellent condition. The crowning glory, however, according to the ownership of the Company, is the construction of a handsome office building located on a site on Second street which is right in the business heart of the city. It lacks not a thing necessary to complete the transaction of the Company's operations from any point of view. Beauty marks the structure; appropriateness stamps its arrangement—external and internal—convenience commends it to the patrons, and comfort completes its charm for those who have it for headquarters, or who have to transact business within its walls. Furthermore, it is a notable addition to the many handsome, noteworthy structures that have caused Macon to become recognized in the South as a city in which things are never done by halves.

A CORRESPONDENT calls our attention to the fact that the United Gas Light and Manufacturing Company, of this city, was the lowest bidder in the competition of last month for the furnishing to and the erection of 11,000 gas post extensions, and the installing thereon, of inverted gas lamps, for account of the Public Lighting Department of the city of Boston. The Company's bid was $8.90 for each post complete. In itemizing its bid the United Company figured $7.45 for the extension post, complete; $1 for erecting each post extension; and 45 cents for installing each inverted lamp. The Company, in a supplementary bid, proposed $6.40 for furnishing the gas mantle lamps. This assembled bid meant $15.30 as the entire cost for lamps, posts and installation.

"WE have here in Sioux City, Ia., a gentleman named Whalen, who is proprietor of a fine cafe known as the 'Mitchell.' He is a careful man, too. His 'place' requires the use of a 60-light meter and he concluded it was 'fast.' Inspector Green was called upon, and test showed the meter was 2.3 per cent. slow. The ordinance considers a meter correct when within 2 per cent. of the actual registration, over or under. So the Company changed the measurer for him. He had that tested, too; but as it showed only 1.8 per cent. slow the Company let 'it go at that.'"

"SUPERINTENDENT VITINGHOFF, of the Haverhill (Mass.) Gas Company, through a detailed story of the merits of the case, has convinced the Municipal Council that Haverhill should have a 'Gay White Way,' the 'way' to begin at the end of Merrimack street, around Washington Square, to Essex and Washington streets. The lighting agent is to be the gas arc, the smallest of which will yield 300-candle power. About 64 lamps will be required, and the expense of the lighting will be borne by the business firms along the lines prescribed. Washington Square will, therefore, in a fortnight or so, be practically disclosed as well at night as by day.—B."

THE sum paid into the City Treasury, of Boston, Mass., by the Boston Consolidated Gas Company, on account of the current tax levy, amounted to $245,000.

AT the meeting of the Rockford (Ills.) Gas Association, held the last week in October, two papers—respectively, by Manager H. S. Whipple, on "Leaks," and that by Mr. F. S. Madden on "Sales"—led to discussions that went to the very root of the topics in hand Mr. Harry L. Wolfe was elected President, vice Mr. Root, who has gone to another branch of the Parent Company, at some point in Michigan.

The Market for Gas Securities.

The tentative plan of reorganization *in re* the Tobacco concern having been approved by the Government's representatives, Consolidated gas scored a gain in the week of practically 5 points! Now, if Mr. Willett can prove that he did not make a contribution to the campaign fund of $10,000, Consolidated should score a further advance of 10 points—confidence being again restored! It is to laugh. The quotation for Consolidated at the opening to day (Friday) was 139¾ to 140.

Brooklyn Union also felt the reassurance that the leading magnates in the Tobacco concern were not even to be jailed, to say nothing of being put to death, in that it advanced 2 points. Lacledes, however, seem doubtful yet over the outlook, in that these declined ½ point, and the Company reported a cash surplus of only $1,040,000. Recent dividends are: Fall River, Mass., 3 per cent. quarterly; Massachusetts gas, 2, preferred, semi-annual; New Britain (Conn.), 2, quarterly. Brig. Gen. George H. Harries of the Byllesby Company, has been elected President of the Louisville (Ky.) Company, and its other self, the Louisville Lighting Company. The Boston Consolidated Gas Company for the last quarter earned a sum equal to the full dividend requirement (8 per cent.) under the sliding scale.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

NOVEMBER 6.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	139⅝	140
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	115	118
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas				
Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	50	70
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	135½	137
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅜	½
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	95	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	85
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed				
Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric				
Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st				
Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. &				
Heating Co.	1,682,750	100	90¼	91
Preferred	3,036,500	100	75¼	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	—		—
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,0 0	—		—
Con. Gas Co., Baltimore				
City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	104½	105
Preferred	2,500,000	100	114	120
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	108	108¾
Massachusetts Gas Companies, of Boston	25,000,000	100	91¾	92
Preferred	25,000,000	100	97	97½
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105¾	106x
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¼	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	100	103
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	97	98
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	439	440
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	280	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October, ——, 1912. Atlantic City, N. J. Officers: President, Ira C. Copley, Aurora, Ills. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ——— Officers: President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Next meeting, Syracuse, N. Y., Nov. 1911. Officers: President, R. M. Searle, Rochester, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E. Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. ———1912, ——— Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 16 East 40th street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, A. L. Eustice, 105 North Wabash avenue.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, ——, 1912; Clinton, Ia. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, Sept. 1912. Manhattan, Kas. Officers: President, B. F. Eyer, Manhattan, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. ———1912;——— Officers: President, F. W. Blowers, Kalamazoo, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1912. Atlanta, Ga. Officers: President, C. L. Holman, St. Louis, Mo.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1912 Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association.—Annual meeting, February 6 and 7, 1912, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary-Treasurer, T. C. Jones, Delaware, O.

Oklahoma Gas, Electric and Railway Association.—President, Noel R. Gascho, Alva Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. ———1912, ——— Officers: President, W. Baurhyte, Los Angeles, Cal.; Vice-President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1912, Williamsport, Pa. Officers, President, C. W. Butterworth, Millon, Pa; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 39th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers, President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, R. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1912; Houston, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis. Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.